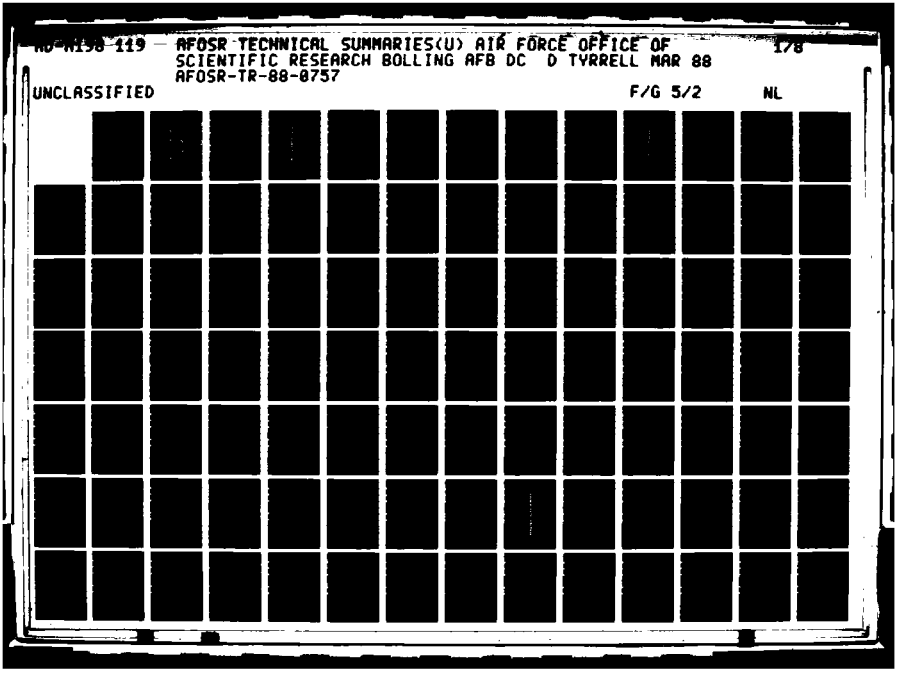
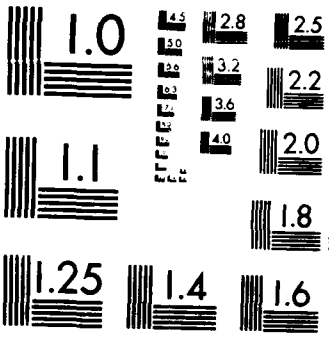

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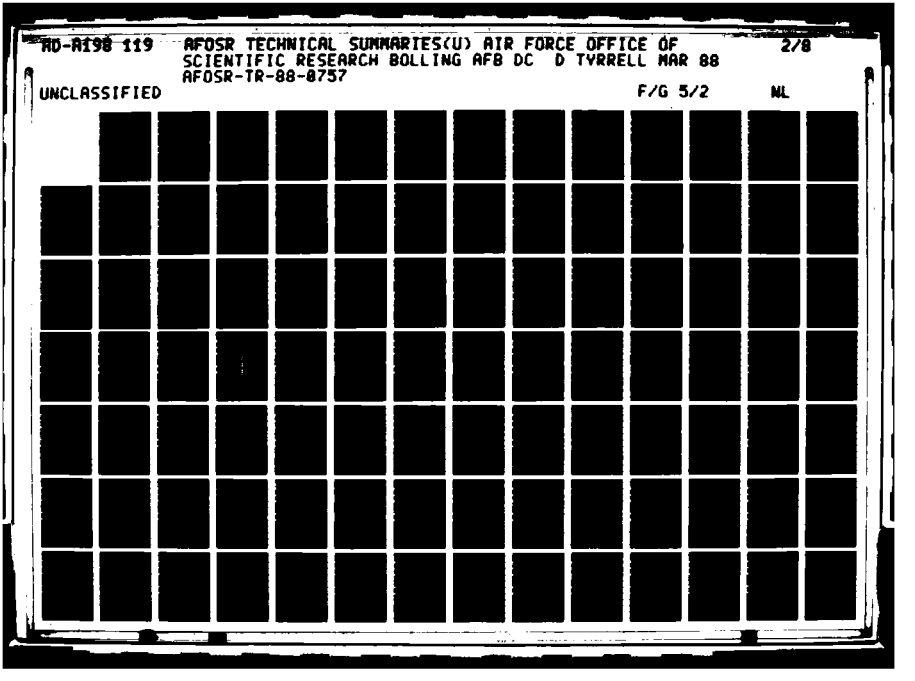
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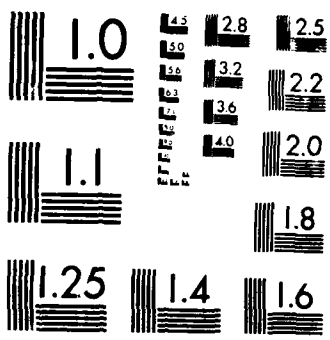
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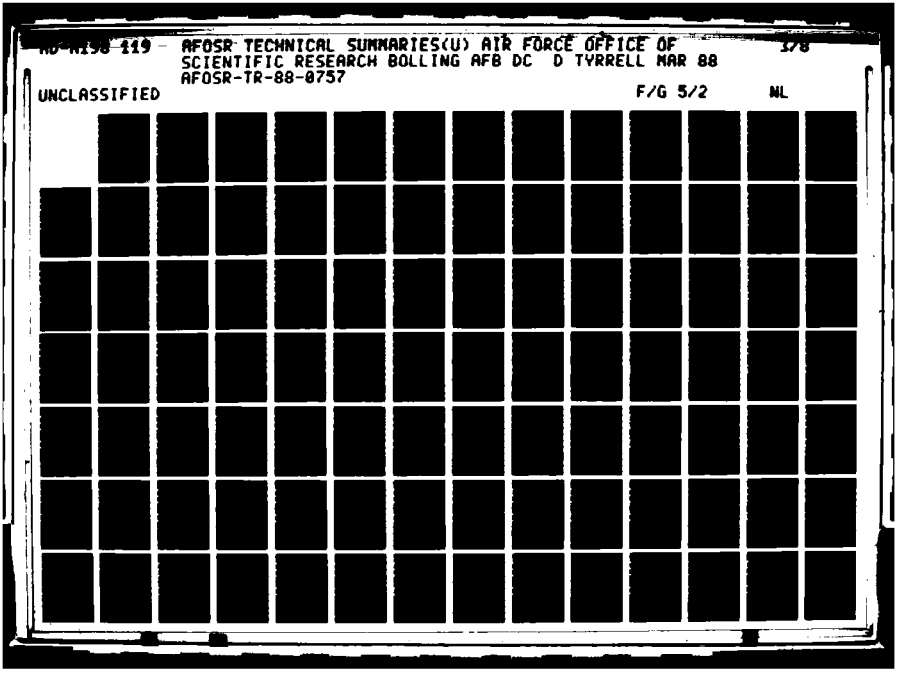
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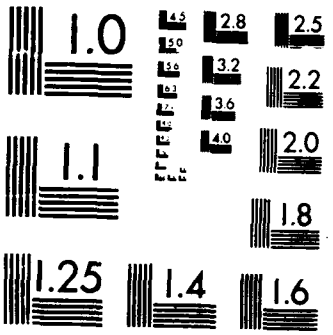
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AD-A186822 REPORT DATE: 31 JUL 87 FINAL REPORT

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AD-A186890 REPORT DATE: 15 JUL 87 FINAL REPORT

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AD-A186395 REPORT DATE: 85 ANNUAL REPORT

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AD-A188283 REPORT DATE: 29 OCT 87 ANNUAL REPORT

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AD-A187103 REPORT DATE: 87 FINAL REPORT

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AD-A186807 REPORT DATE: JUL 87 FINAL REPORT

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AD-A188279 REPORT DATE: 05 OCT 87 FINAL REPORT

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AD-A185597 REPORT DATE: APR 87 FINAL REPORT

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AD-A189192 REPORT DATE: JUN 86 FINAL REPORT

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AD-A187952 REPORT DATE: 12 MAR 86 FINAL REPORT

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AD-A186583 REPORT DATE: 11 AUG 87 FINAL REPORT

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AD-A187563 REPORT DATE: 30 SEP 87 FINAL REPORT

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AD-A186250 REPORT DATE: 85 FINAL REPORT

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AD-A188498 REPORT DATE: 07 OCT 87 FINAL REPORT

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AD-A187020 REPORT DATE: 87 FINAL REPORT

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AD-A186341 REPORT DATE: 19 JUN 87 FINAL REPORT

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AD-A185346 REPORT DATE: 87 FINAL REPORT

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AD-A189098 REPORT DATE: 86 FINAL REPORT

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AD-A187018 REPORT DATE: 87 FINAL REPORT

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AD-A187335 REPORT DATE: 10 JUL 87 FINAL REPORT

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AD-A187662 REPORT DATE: 87 ANNUAL REPORT

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AD-A185339 REPORT DATE: 87 FINAL REPORT

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AD-A187656 REPORT DATE: 87 ANNUAL REPORT

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AD-A187464 REPORT DATE: OCT 87

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AD-A186036 REPORT DATE: DEC 86 ANNUAL REPORT

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AD-A185525 REPORT DATE: JUL 87 FINAL REPORT

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AD-A185587 REPORT DATE: 86 ANNUAL REPORT

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AD-A186404 REPORT DATE: 25 JAN 87 FINAL REPORT

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AD-A185735 REPORT DATE: JUN 87 ANNUAL REPORT

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AD-A187559 REPORT DATE: 30 MAR 87 FINAL REPORT

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AD-A187567 REPORT DATE: 01 OCT 87

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AD-A187742 REPORT DATE: JUL 87 FINAL REPORT

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AD-A185392 REPORT DATE: MAY 85 FINAL REPORT

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AD-A185466 REPORT DATE: 24 JUN 87 FINAL REPORT

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AD-A185733 REPORT DATE: JUL 87 ANNUAL REPORT

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AD-A187534 REPORT DATE: OCT 87 FINAL REPORT

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AD-A185764 REPORT DATE: JUN 87 FINAL REPORT

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AD-A186476 REPORT DATE: FEB 87 FINAL REPORT

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AD-A186860 REPORT DATE: 87 FINAL REPORT

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AD-A186669 REPORT DATE: 15 JAN 87 FINAL REPORT

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4-dienediyl (1-Metallacyclohexa-2,4-diene) Complexes of Rhodium(III) and Iridium(III) and Their Conversion to
(Eta5-Cyclopentadienyl)Hydridometal Compounds,
AD-A186342 REPORT DATE: 87 FINAL REPORT

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AD-A186183 REPORT DATE: 86 FINAL REPORT

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AD-A185624 REPORT DATE: 01 JUL 87 FINAL REPORT

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AD-A187505 REPORT DATE: 15 AUG 87 FINAL REPORT

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AD-A185643 REPORT DATE: 01 AUG 87 FINAL REPORT

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AD-A187758 REPORT DATE: 22 APR 86 FINAL REPORT

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AD-A187697 REPORT DATE: 03 APR 87 FINAL REPORT

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AD-A186353 REPORT DATE: 10 JUN 87 FINAL REPORT

A Two-Dimensional Ising Model in a Magnetic Field - A Scalar Representation of the Partition Function,
AD-A186145 REPORT DATE: 87 FINAL REPORT

Two-Photon VUV Laser-Induced Fluorescence Detection of I*2P(1/2) and I2P(3/2) from Alkyl Iodide Photodissociation at 248 nm,
AD-A185726 REPORT DATE: 27 MAR 87 ANNUAL REPORT

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AD-A185519 REPORT DATE: DEC 86 FINAL REPORT

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AD-A187640 REPORT DATE: NOV 87 FINAL REPORT

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AD-A186211 REPORT DATE: 14 JUL 87 FINAL REPORT

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AD-A186489 REPORT DATE: MAY 86 FINAL REPORT

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AD-A186490 REPORT DATE: MAY 86 FINAL REPORT

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AD-A187859 REPORT DATE: MAY 86

United States Air Force Research Initiation Program. 1984 Research Reports. Volume 4.
AD-A187860 REPORT DATE: MAY 86

United States Air Force Research Initiation Program. 1985 Technical Report. Volume 1.
AD-A186491 REPORT DATE: APR 87 FINAL REPORT

United States Air Force Research Initiation Program. 1985 Technical Report. Volume 2.
AD-A186492 REPORT DATE: APR 87 FINAL REPORT

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AD-A186493 REPORT DATE: APR 87 FINAL REPORT

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AD-A186155 REPORT DATE: APR 86 FINAL REPORT

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AD-A186767 REPORT DATE: AUG 87 ANNUAL REPORT

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AD-A186120 REPORT DATE: 14 APR 87 FINAL REPORT

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AD-A187687 REPORT DATE: 30 OCT 87 ANNUAL REPORT

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AD-A186858 REPORT DATE: AUG 87 FINAL REPORT

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AD-A186032 REPORT DATE: JUN 87 ANNUAL REPORT

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AD-A186712 REPORT DATE: MAR 87 FINAL REPORT

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AD-A185630 REPORT DATE: 25 SEP 87 FINAL REPORT

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AD-A187334 REPORT DATE: 31 JUL 87 FINAL REPORT

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AD-A186169 REPORT DATE: 12 JUN 87 FINAL REPORT

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AD-A187650 REPORT DATE: 15 SEP 87

Vibrationally State-Selected Reactions of Ammonia Ions. 3. NH3(+)(v)+ND3 and ND3(+)(v)+NH3,
AD-A187651 REPORT DATE: 15 SEP 87

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AD-A187569 REPORT DATE: 29 SEP 87 ANNUAL REPORT

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AD-A188086 REPORT DATE: 15 AUG 87 ANNUAL REPORT

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AD-A186773 REPORT DATE: 02 OCT 87 ANNUAL REPORT

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AD-A187942 REPORT DATE: 03 NOV 87 ANNUAL REPORT

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AD-A187943 REPORT DATE: 06 NOV 86 ANNUAL REPORT

Visualization of the Structure of a Pulsed Methane-Air Diffusion Flame,
AD-A186170 REPORT DATE: AUG 85 FINAL REPORT

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AD-A189301 REPORT DATE: 01 AUG 87 FINAL REPORT

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AD-A187789 REPORT DATE: 87 ANNUAL REPORT

Wake Interaction Effects on the Transition Process on Turbine Blades.
AD-A188020 REPORT DATE: 30 OCT 87 ANNUAL REPORT

Wave Propagation Experiments on 22-Bay Lattice.
AD-A186140 REPORT DATE: 01 JUN 87 ANNUAL REPORT

Weak Convergence of Sums of Moving Averages in the Alpha-Stable Domain of Attraction.
AD-A186430 REPORT DATE: JUN 87 FINAL REPORT

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AD-A187621 REPORT DATE: 28 SEP 87 FINAL REPORT

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AD-A187786 REPORT DATE: 85 ANNUAL REPORT

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AD-A188680 REPORT DATE: JAN 86 ANNUAL REPORT

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AD-A185465 REPORT DATE: JUN 87 FINAL REPORT

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AD-A188678 REPORT DATE: 27 JUN 87 FINAL REPORT

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AD-A189097 REPORT DATE: 87 FINAL REPORT

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AD-A188229 REPORT DATE: JUN 87 FINAL REPORT

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-B116 907L 7/1 13/8

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

(U) Investigations into the Origins of the Physical Structure of Thin Films.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Jun 87,

SEP 87 119P

PERSONAL AUTHORS: Messier, Russell

CONTRACT NO. AFOSR-84-0149

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR TR-87-1582

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by AFOSR/XOTD, Bldg. 410, Bolling AFB, DC 20332, 17 Nov 87, or higher DoD authority.

DESCRIPTORS: (U) *MORPHOLOGY, *THIN FILMS, ADATOMS, CONTROL, DEPOSITION, EXPERIMENTAL DATA, EXTERNAL, GRAIN BOUNDARIES, GRAIN STRUCTURES(METALLURGY), INTERNAL, IONS, MOBILITY, PERCEPTION(PSYCHOLOGY), PHYSICAL PROPERTIES, SPUTTERING.

IDENTIFIERS: (U) Fractals, PE61102F, WUAFOSR2306B2.

AD-B116 907L

AD-B115 606L 14/2 5/2

B-K DYNAMICS INC ROCKVILLE MD

(U) Identification of Air Force Emerging Technologies and Military Significant Emerging Technologies.

DESCRIPTIVE NOTE: Final technical rept. 20 Jul 85-19 Oct 86,

OCT 86 256P

PERSONAL AUTHORS: McDermott, Patrick P.; Attard, Anthony C.

REPORT NO. BKD-TR-6-810

CONTRACT NO. F49620-85-C-0113

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-0880

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by AFOSR/NC, Bldg 410, Bolling AFB, Washington, DC 20332-6448 27 Apr 87, or Higher DoD authority. Availability: Microfiche copies only.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *COMPUTERS, *INTERVIEWING, *LABORATORIES, AERODYNAMICS, AIR FORCE, AIR FORCE FACILITIES, COMPUTER PROGRAMS, DATA PROCESSING, DETECTORS, DOCUMENTS, ELECTRIC POWER, ELECTRONIC EQUIPMENT, ELECTRONS, FUELS, HIGH DENSITY, HIGH ENERGY, IDENTIFICATION, MICROELECTRONICS, OPTICAL EQUIPMENT, SIGNAL PROCESSING.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-B115 606L

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 619 21/3

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Diagnostics for Intelligent Control of MPD (Magneto-Plasma Dynamic) Engines.

DESCRIPTIVE NOTE: Annual rept. no. 2, Sep 86-Sep 87,

OCT 87 161P

PERSONAL AUTHORS: Shoureshi, R.; Murthy, S. N.

CONTRACT NO. AFOSR-86-0278

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0029

UNCLASSIFIED REPORT

ABSTRACT: (U) In developing an approach to determining diagnostics for intelligent control of MPD thrusters, two concurrent studies have been carried out: a stability analysis, and a plasma modeling. An advanced technique for derivation of stability requirements of distributed parameter systems based on mathematical theorems of semigroups and groups, equivalent norms, Lyapunov functionals, etc. has been developed. Application of this technique to the MPD thrusters has resulted in control inputs for stabilizability of the system when perturbed from a general equilibrium state of the plasma. A model has been developed for the state of plasma near the cathode of a MPD thruster engine. The region has been divided into collisionless and collisional parts and full account is taken of the non-equilibrium state of the plasma over the entire region. A scheme for solving the set of describing equations based on an interative procedure has been developed. For low and high current inputs, it is expected that the extent of the different regions and the marching conditions in the different regions will change indicating the trends towards the arising of onset instability. Keywords: Plasma dynamics; MPD modeling; Stability; Controllability; Observability; Nonlinear systems; Distributed parameter systems.

AD-A189 619 CONTINUED

DESCRIPTORS: (U) *THRUSTERS, *PLASMA ENGINES, DYNAMICS, EQUILIBRIUM(GENERAL), HIGH POWER, NONEQUILIBRIUM FLOW, NONLINEAR SYSTEMS, PLASMAS(PHYSICS), REQUIREMENTS, STABILITY, PLASMA DIAGNOSTICS, PLASMA CONTROL, LYAPUNOV FUNCTIONS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) Magnetoplasma Dynamics, Plasma thrusters, Plasma instabilities, Lyapunov stability analysis , Maxwell boltzmann statistics, Debye length, PE61102F, WUAFOSR2308A1.

AD-A189 619

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 609 21/2

CALIFORNIA INST OF TECH PASADENA

(U) Investigations into Shock-Induced Enhancement of Mixing and Combustion in Supersonic Burners.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 86-30 Sep 87,

NOV 87 23P

PERSONAL AUTHORS: Marble, Frank E.

CONTRACT NO. F49620-86-C-0113

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR TR-88-0030

UNCLASSIFIED REPORT

ABSTRACT: (U) Modifications to three major facilities at Caltech, carried out in preparation for an extensive investigation of shock enhanced mixing and combustion in supersonic combustion ramjets, has progressed according to schedule. Work is complete on the GALCIT 17-inch shock tube and on the Unsteady Combustion Facility, and they are operating as planned. Extensive improvement of the optical diagnostics and data acquisition equipment for both of these is nearly complete. Design of the new heated-hydrogen leg for the Hydrogen/Fluorine facility has been simplified considerably from the original concept and is progressing satisfactorily. Extensive computational studies of the interaction between weak shock waves and isolated regions of hydrogen embedded in air has revealed a behavior which suggests that considerable technological advantage may accrue by the use of multiple weak shocks to enhance mixing. Keywords: Supersonic combustion; Vortex burning mixing; Shear layers vorticity generation; Shock enhanced mixing.

DESCRIPTORS: (U) *BURNERS, *SHOCK WAVES, *SUPERSONIC CHARACTERISTICS, *SUPERSONIC COMBUSTION, COMPUTATIONS, DATA ACQUISITION, DATA PROCESSING EQUIPMENT, DIAGNOSIS(GENERAL), FACILITIES, FLUORINE, HYDROGEN, ISOLATION, LAYERS, LOW INTENSITY, LOW STRENGTH, MIXING,

AD-A189 609

AD-A189 609 CONTINUED

OPTICAL ANALYSIS, SHEAR PROPERTIES, SHOCK(MECHANICS), SUPERSONIC COMBUSTION RAMJET ENGINES, VORTICES.

IDENTIFIERS: (U) PE61103F, WUAFOSR3484A1.

AD-A189 609

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 608 1/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Calculated Unsteady Aerodynamics of Wings.

DESCRIPTIVE NOTE: Annual technical rept. May 86-Nov 87,

DEC 87 55P

PERSONAL AUTHORS: McCune, James E.

CONTRACT NO. AFOSR-86-0157

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR TR-88-0031

UNCLASSIFIED REPORT

ABSTRACT: (U) Substantial advances in the analysis of the large-amplitude unsteady aerodynamics of wings have been achieved. Special focus has been placed on developing techniques for describing the exact non-linear convection, deformation, and roll-up of the vorticity wakes above and behind active wing surfaces. Using a combination of analytic and computer-interactive methods, new insights and more exact aerodynamic performance results have been generated. The effects of dissipative internal 'cores' in the overall 3D wake structures above deltas have been analyzed in the slender wing limit. New paths for further computer-assisted advances, including improved understanding of wing-wake interaction in severe maneuver, vortex core formation and break-up, and aerodynamic history effects have been charted. Papers are included on the following topics: Nonlinear aerodynamics of two-dimensional airfoils in severe maneuver; Interactive aerodynamics of wings in severe maneuver; Slender wing theory including regions of embedded total pressure loss; Keywords: Unsteady wing theory; Wake evolution; Vortex core evolution; Flight maneuvers; Unsteady wing loads; Flight loads.

DESCRIPTORS: (U) *WINGS, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC FORCES, AERODYNAMICS, AMPLITUDE, COMPUTERS, CONVECTION, CORES, DEFORMATION, DISSIPATION,

AD-A189 608

AD-A189 608 CONTINUED

EVOLUTION(GENERAL), FLIGHT LOADS, FLIGHT MANEUVERS, HIGH RATE, HISTORY, INTENSITY, INTERACTIONS, INTERACTIVE GRAPHICS, INTERNAL, LIMITATIONS, LOSSES, MANEUVERS, NONLINEAR SYSTEMS, PATHS, PRESSURE, SLENDER BODIES, SURFACES, THEORY, UNSTEADY FLOW, VORTICES, WAKE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 607 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Control of Structure in Turbulent Flows: Bifurcating and Blooming Jets.

DESCRIPTIVE NOTE: Final rept. 1 Feb 84-31 May 87,

OCT 87 49P

PERSONAL AUTHORS: Reynolds, W. C.; Parekh, D. E.

CONTRACT NO. F49620-84-K-0005

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-88-0036

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of this work is to control jet flows by properly organizing the dominant large-scale vortex structures. The work has focused on understanding the influence of excitation frequency and amplitude on the large-scale structures of these flows at various Reynolds numbers. Specifically, the effects of dual-mode forcing on the structure, momentum, and mixing characteristics of turbulent jets have been investigated using a combination of laboratory experiments and numerical simulations. The combination of properly-selected axial and orbital excitation has been shown to have dramatic effect on the structure and mixing of round jets. Experiments and numerical simulations show that these phenomena are due to interaction between the large-scale vortices in the jet near field. The position and phasing of these vortices can be altered by relatively weak excitation, causing the jet to divide into two separate jets (bifurcation) or to explode (bloom) in a shower of vortex rings. This report summarizes the key results of studies in water and low-speed air flows.

DESCRIPTORS: (U) *TURBULENT FLOW, *VORTICES, *JET FLOW, AIR FLOW, CONTROL SYSTEMS, EXCITATION, FREQUENCY, LABORATORY TESTS, LOW STRENGTH, LOW VELOCITY, MIXING, MOMENTUM, NUMERICAL ANALYSIS, REYNOLDS NUMBER, RINGS, STRUCTURAL PROPERTIES, STRUCTURES, WATER, JET MIXING FLOW,

AD-A189 607 CONTINUED

NEAR FIELD.

IDENTIFIERS: (U) Bifurcating jets, Blooming jets, Flow control, Dual mode forcing, PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 606 7/4 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Picosecond Laser Studies of Excited State Processes.

DESCRIPTIVE NOTE: Scientific rept. 1 Oct 84-30 Sep 87,

SEP 87 48P

PERSONAL AUTHORS: Eisenthal, Kenneth B.

CONTRACT NO. AFOSR-84-0013

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0124

UNCLASSIFIED REPORT

ABSTRACT: (U) The completed research was directed at fundamental investigations of ultra fast chemical reactions, the generation and decay of reactive chemical intermediates, as well as the role of the solvent and molecular motions on chemical dynamics. The construction of an amplified CPM laser enabled the opportunity to prove chemical events occuring in the femtosecond time domain. The effects of molecular geometry, solvent and solute steric effects, on the chemical dynamics was explored. An important new component of the research was the studies of chemical phenomena on surfaces as well as in bulk media. The asymmetry of forces associated with liquid surfaces was found to impose new restraints and possibilities on the generation of chemical species; thus affecting the chemical species lifetimes, motions and pathways for reaction.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *QUICK REACTION, *REACTION KINETICS, DYNAMICS, LASERS, LIQUIDS, MOLECULAR STRUCTURE, MOLECULES, MOTION, SOLVENTS, SURFACES, TIME DOMAIN, SHORT RANGE(TIME), LIGHT PULSES, PULSED LASERS, CARBENES.

IDENTIFIERS: (U) Carbene/dimesityl, Carbene/paracyclophane, Femtosecond time, Second harmonic generation, Oxirane/tetraphenyl, Carbene/Diphenyl, Enylidene/Dibenzocycloheptadi, PE61102F, WUAFOSR2303B2.

AD-A189 606

AD-A189 605 3/1

MASSACHUSETTS UNIV AMHERST DEPT OF PHYSICS AND ASTRONOMY

(U) Analysis of Deep Sky Sources Found by the Infrared Astronomy Satellite.

DESCRIPTIVE NOTE: Final technical rept. 30 Jan 85-29 Jul 87,

DEC 87 16P

PERSONAL AUTHORS: Kleinmann, Susan G.

CONTRACT NO. AFOSR-85-0057

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-88-0038

UNCLASSIFIED REPORT

ABSTRACT: (U) This program was aimed at understanding the number and types of sources found in the fields observed with greatest sensitivity by the IRAS satellite. The initial phase of the study emphasized observation and analysis of sources found in the less sensitive all sky survey carried out with Infrared Astronomy Satellite. Significant differences between the bright and faint 12 um sources were found, which constrain their relative spatial distributions and luminosities. A study focussed one one, large population of infrared-bright stars -- those whose atmospheres are rich in carbon - yielded measurements of their space distribution range of mass loss rates, and lifetimes. An analysis of 60 um sources from the IRAS survey showed that eighty-five percent of those located more than thirty degrees above the plane of the Galaxy are extragalactic objects, provided a measure of the space density of galaxies of different infrared luminosities, and showed that there are significant differences in the environment and infrared properties of the most luminous and least luminous galaxies. Studies of galaxies with particularly strong mid-infrared emission resulted in the discovery of ultraluminous objects. Initial studies of results from the IRAS pointed observations show effects of contamination by low-surface-

AD-A189 605

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 605 CONTINUED

brightness intestellar clouds.

DESCRIPTORS: (U) *ASTRONOMY, *GALAXIES, *INFRARED STARS, *SCIENTIFIC SATELLITES, *INFRARED DETECTORS, ARTIFICIAL SATELLITES, CLOUDS, EMISSION, EXTRATERRESTRIAL RADIO WAVES, INFRARED RADIATION, INTERMEDIATE INFRARED RADIATION, LOSSES, LUMINOSITY, MASS, RATES, SENSITIVITY, SPATIAL DISTRIBUTION, SURVEYS.

IDENTIFIERS: (U) *Infrared astronomy, IRAS(Infrared Astronomy Satellite), PE61102F, WUAFOSR2311A1.

AD-A189 605

AD-A189 563 7/3

SAN DIEGO STATE UNIV CA DEPT OF CHEMISTRY

(U) Kinetics of sec-Butylsilylene Isomerization to 2,3-Dimethylsilacyclopropane and the Decomposition and Isomerization Kinetics of 2,3-Dimethylsilacyclopropane.

87 8P

PERSONAL AUTHORS: Dickinson, A. P.; Nares, K. E.; Ring, M. A.; O'Neal, H. E.

CONTRACT NO. AFOSR-83-0209

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0115

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v6 n12 p2596-2600 1987.

ABSTRACT: (U) Silylene, generated from the thermal decomposition of silane between 643 and 689 K, reacts with 1-butene to produce n-butyl- and sec-butylsilane and cis- and trans- 2-butene. The mechanism of the reaction involves butylsilylene and silacyclo-propane intermediates. Sec-Butylsilylene isomerizes to 2,3-dimethylsilacyclopropane with an activation energy of E21 = 11.6 + or - 2.6 kcal, while the activation energy for the decomposition of 2,3-dimethylsilacyclopropane (to 2-butenes and silylene) is significantly higher than the activation energy for its back reaction to sec-butylsilylene, (E22-E-21) = 11.5 + or - 0.5 kcal. Further the decomposition of the silacyclopropane is several times faster than its isomerization, indicating a high A factor and consecutive step, biradical mechanism for the decomposition.

DESCRIPTORS: (U) *CYCLOPROPANES, *ISOMERIZATION, *SILANES, *REACTION KINETICS, ACTIVATION ENERGY, DECOMPOSITION, PYROLYSIS, RESPONSE, SILICON COMPOUNDS, REPRINTS.

IDENTIFIERS: (U) *Dimethylsilacycloycropane, PE61102F,

AD-A189 563

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 563 CONTINUED

WUAFOSR2303B2.

AD-A189 562 4/1

SOUTHWEST RESEARCH INST SAN ANTONIO TX

(U) E and F Region Study of the Evening Sector Auroral Oval: A Chatanika/Dynamics Explorer 2/NOAA 6 Comparison,

MAR 87 20P

PERSONAL AUTHORS: Senior, C.; Sharber, J. R.; De La Beaujardiere, O.; Heelis, R. A.; Evans, D. S.

CONTRACT NO. F49620-85-C-0029, F49620-83-K-0005

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-88-0111

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v92 nA3 p2477-2494, 1 Mar 87. Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Simultaneous data obtained with the Chatanika incoherent scatter radar and the Dynamics Explorer 2(DE2) and NOAA 6 satellites are used to relate the locations of the precipitating particles, field-aligned currents, and E and F region ionization structures in the evening-sector auroral oval. The auroral - E layer observed by the radar extends about 2 deg equatorward of the electron precipitation region, and its equatorward edge coincides with the equatorward edges of the region 2 field-aligned current and intense convection region (E approx. 50 mV/m). It is shown that precipitating protons are responsible for part of the E region ionization within the electron precipitation region as well as south of it. E region density profiles calculated from ion spectra measured by the DE2 and NOAA 6 satellites are in fairly good agreement with the Chatanika data. In the F region, a channel of enhanced ionization density, elongated along the east-west direction and having a width of about 100 km, marks the poleward edge of the main trough. It is colocated with the equatorward boundary of the electron precipitation

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from the central plasma sheet. Although enhanced fluxes of soft electron are observed at this boundary, the energy input to the ionospheric electron gas, calculated from the radar data, shows that this ionization channel is not locally produced by this soft precipitation, but that it is rather a convected feature. In fact, both the trough and the ionization channel are located in a region where the plasma flows sunward at high speed, but the flux tubes associated with these two features have different convective time histories.

DESCRIPTORS: (U) *AURORAE, *RADAR REFLECTIONS, ALIGNMENT, CHANNELS, CONVECTION, DENSITY, E REGION, ELECTRON GAS, ELECTRONS, ENERGY, F REGION, FLOW, INCOHERENT SCATTERING, INPUT, INTENSITY, IONIZATION, IONOSPHERE, IONS, PARTICLES, PLASMAS(PHYSICS), PRECIPITATION, PROFILES, PROTONS, RADAR, SHEETS, SPECTRA, SYNCHRONISM, TIME, ELECTRIC CURRENT, CONVECTION(ATMOSPHERIC), REPRINTS, TRANSPORT PROPERTIES.

IDENTIFIERS: (U) Dynamics Explorer 2 Satellite, Electron precipitation.

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AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA

(U) A Space-Borne Passive Infrared Experiment for Remote Sensing of the Atomic Oxygen Density and Temperature, and Total Density in the Upper Atmosphere,

87 9P

PERSONAL AUTHORS: Sharma, Ramesh D.; Stair, A. T., Jr.; Smith, Howard A.

PROJECT NO. 2310

TASK NO. G4

MONITOR: AFOSR TR-88-0120

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Space Research, v7 n10 p(10)31-(10)38 1987.

ABSTRACT: (U) It is proposed to measure the line intensities and profiles of the 63 micrometer 3P sub 1 - 3P sub 2 transition and 147 micrometer 3P sub 0 - 3P sub 1 transition of the ground electronic state of atomic oxygen from a space-borne platform in a limb-viewing mode. The temperature and atomic oxygen density can be obtained by inversion from the total radiances in the two channels. The line profiles provide a confirmation of temperature and, in addition, yield the component of the wind speed along the line-of-sight. In the optically thick regime (below tangent height < 170 KM for 63um line), the radiation escapes primarily from the pressure-broadened portions of the line. This permits a determination of the pressure if we know the pressure-broadening coefficient and its dependence upon temperature.

DESCRIPTORS: (U) *UPPER ATMOSPHERE, *INFRARED DETECTION, *ATMOSPHERIC DENSITY, DETERMINATION, DUAL CHANNEL, ELECTRONIC STATES, GROUND STATE, INFRARED RADIATION, INTENSITY, PASSIVE SYSTEMS, PLATFORMS, PRESSURE, PROFILES, RADIANCE, REMOTE DETECTORS, REPRINTS, SPACEBORNE, WIND VELOCITY, OXYGEN.

IDENTIFIERS: (U) Pressure broadening, PE61102F, WUAFOSR2310G4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 532 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Spectroscopic Observation of Silylene-Ether Complexes.

87 3P

PERSONAL AUTHORS: Gillette, Gregory R.; Noren, George H.; West, Robert

CONTRACT NO. F49620-86-C-0010, $NSF-CHE83-1882002

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0143

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v6 p2617-2618 1987.

ABSTRACT: .(U) Summary: The ultraviolet photolysis of linear trisilanes in 2-MeTHF at 77 K has led to the first spectroscopic detection of silylene ether complexes. The complexes are also formed during the annealing of mixed 3-MP/2-MeTHF glasses. Chemical evidence for complexed silylenes based on competitive trapping studies as well as evidence that the silylene-either complexes have a significant life time in solution at low temperatures is presented. The isolation of silylenes in argon or hydrocarbon matrices has in recent years contributed greatly to the knowledge of these reactive species. Here we report the results of recent investigations of diorganosilylenes in pure 2-methyltetrahydrofuran (2-MeTHF) glasses and in 3-methylpentane (3-MP) matrices containing ether dopants, leading to the first spectroscopic observation of silylene ether complexes.

DESCRIPTORS: (U) *SPECTROSCOPY, *SILANES, ANNEALING, ARGON, DETECTION, LOW TEMPERATURE, OBSERVATION, PHOTOLYSIS, REACTIVITIES, SOLUTIONS(GENERAL), ULTRAVIOLET RADIATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A189 532

AD-A189 531 7/4

GEORGIA INST OF TECH ATLANTA SCHOOL OF MECHANICAL ENGINEERING

(U) Asymptotically Correct Collisional Presheaths.

DESCRIPTIVE NOTE: Rept. for 1 Sep 85-19 Aug 87,

JUN 87 14P

PERSONAL AUTHORS: Main, Geoffrey L.

CONTRACT NO. AFOSR-85-0375

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0114

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Physics of Fluids, v30 n6 p1800-1809 Jun 87.

ABSTRACT: (U) Few exact solutions for collisional presheaths exist because of the difficulty of simultaneously satisfying both the collisional Boltzmann equation and the Poisson equation. The exact solutions that do exist are for very specialized collision terms such as constant cross-section charge exchange with cold neutrals. The present paper presents an asymptotic method which is applicable to a variety of collision terms and is applied in particular to constant collision frequency charge exchange with noncold neutrals. Constant collision frequency and constant cross-section collision with cold neutral results are also presented. The first order terms for the presheath potential rise and ion distribution functions are calculated and its is shown that second- and higher-order terms can be calculated using a multiexponential expansion for presheath potential rise. The first-order cold neutral constant cross-section results correspond well to the exact solution. The calculated presheath potential rises are of the order expected from the Bohm criterion, and in some of the specialized cold neutral cases, exactly k sub e/2. The presheath potential rise is reduced by a neutral plasma potential gradient which accelerates ions toward the

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presheath. In all cases the collisional presheath is asymptotically matched to both the neutral plasma and the collisionless sheath.

DESCRIPTORS: (U) *BOLTZMANN EQUATION, *CHARGE TRANSFER, *COLLISIONS, *IONS, CROSS SECTIONS, DISTRIBUTION FUNCTIONS, FREQUENCY, GRADIENTS, LOW TEMPERATURE, NEUTRAL, PLASMAS(PHYSICS), POISSON EQUATION, REPRINTS.

AD-A189 530 7/4

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Estimation of Absolute Number Densities from Shapes of Atomic Fluorescence Curves of Growth.

87 10P

PERSONAL AUTHORS: Smith, B. W.; Rutledge, M. J.; Winefordner, J. D.

CONTRACT NO. AFOSR-86-0015

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-88-0110

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Spectroscopy, v41 n4 p613-620 1987.

ABSTRACT: (U) A general purpose computer program has been developed to calculate atomic fluorescence curves of growth (COG) for a wide variety of cases and particularly for the experimentally interesting cases where the excitation source spectral bandwidth is not much different from the absorption linewidth in typical flames and plasmas. Calculations over a wide range of the variables which affect the shape of the COG in the high-number-density region show that the point of departure from linearity can be used to predict the absolute number density in the atomizer cell. For resonance atomic fluorescence, the point at which the experimental curve of growth is twofold below the low-density linear asymptote invariably occurs at koL (peak absorption coefficience x absorption pathlength) product of 2 + or -. Keywords: Atomic fluorescence, Number densities, Damping constants, Self absorption, Curves, Growth.

DESCRIPTORS: (U) *ABSORPTION, *ATOMIZATION, *SPECTRAL LINES, *FLUORESCENCE, BAND SPECTRA, BANDWIDTH, CELLS, COMPUTER PROGRAMS, CONSTANTS, DAMPING, DENSITY, EXCITATION, FLAMES, GRAPHS, GROWTH(GENERAL), PEAK VALUES, RANGE(EXTREMES), SOURCES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

AD-A189 529 12/2

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MATHEMATICS

(U) Computing Optimal Boundary Controls of a Plate by the Boundary Element Method.

DEC 87 7P

PERSONAL AUTHORS: Chen, Goong; Zhou, Jianxin

CONTRACT NO. AFOSR-85-0253

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0156

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Decision and Control (26th), p992-996 Dec 87.

ABSTRACT: (U) In recent development of adaptive optics, the problem of shape control of a deformable mirror is studied. Assume that the mirror is modelled by a thin elastostatic plate. At certain interior points of the plate a number of sensors are located which measure the deformation at those points. We wish to apply boundary controls to the plate so that the sensory data are as close to the prescribed values as possible. In this paper we present a boundary element method to approximate optimal boundary controls for quadratic cost problem. The method has been tested to have high accuracy and efficiency. Preliminary numerical results are also presented.

DESCRIPTORS: (U) *OPTIMIZATION, *ADAPTIVE CONTROL SYSTEMS, ACCURACY, ADAPTIVE SYSTEMS, BOUNDARIES, CONTROL, COSTS, DEFORMATION, DETECTORS, HIGH RATE, MIRRORS, NUMERICAL ANALYSIS, OPTICS, QUADRATIC EQUATIONS, REPRINTS, SHAPE, PARTIAL DIFFERENTIAL EQUATIONS, ELECTROSTATICS, BOUNDARY VALUE PROBLEMS.

IDENTIFIERS: (U) Adaptive optics, *Boundary element method, PE61102F, WUAFOSR2304A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 528 12/2

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) A Remark on Bilinear Systems and Moduli Spaces of Instantons,

87 9P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

MONITOR: AFOSR TR-88-0122

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems & Control Letters, v9 p361-367 1987.

ABSTRACT: (U) Explicit equations are given for the moduli space of framed instantons as a quasi-affine variety, based on the representation theory of noncommutative power series, or equivalently, the minimal realization theory of bilinear systems.

DESCRIPTORS: (U) *MATRIX THEORY, EQUATIONS, REPRINTS, THEORY, POWER SERIES, IMAGE PROCESSING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304.

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AD-A189 527 20/12

HUGHES RESEARCH LABS MALIBU CA

(U) Development of Si/SiGe Heterostructures.

DESCRIPTIVE NOTE: Quarterly rept. Sep-Dec 87,

JAN 88 17P

PERSONAL AUTHORS: Hauenstein, R. J.; Marsh, O. J.

REPORT NO. HAC-Ref-G3810

CONTRACT NO. F49620-87-C-0104, $$DARPA Order-6140

MONITOR: AFOSR TR-88-0093

UNCLASSIFIED REPORT

ABSTRACT: (U) With the recent advances in Si molecular beam epitaxy (MBE), a heterojunction-based device technology for Si may soon be at hand. Strained-layer Si(1-x)Ge(x) epitaxial alloy films and coherently strained Si(1-x)Ge(x)/Si multilayer structures have been grown very successfully by MBE. Si(1-x)Ge(x) systems are of considerable interest because they promise to extend the capabilities of heterojunction-based devices to the already well established realm of Si technology. The major impact of heterojunction technology applied to Si electronic devices is expected to twofold: in the performance improvement of certain conventional Si devices such as the n-p-n bipolar transistor, and in the development within Si technology of novel device structures such as the High Electron-Mobility Transistor (HEMT).

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *HETEROJUNCTIONS, *MOLECULAR BEAMS, ELECTRON MOBILITY, ELECTRONIC EQUIPMENT, GERMANIUM, HIGH RATE, SILICON, TRANSISTORS, BIPOLAR TRANSISTORS.

IDENTIFIERS: (U) NPN Transistors, HEMT(High Electron Mobility Transistors), PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 526 11/6.2

GEORGIA INST OF TECH ATLANTA SCHOOL OF MATERIALS ENGINEERING

(U) The Effect of Microstructure on the Fatigue Crack Growth Resistance of Nickel Base Superalloys.

DESCRIPTIVE NOTE: Final Technical rept. 1 May 84-30 Sep 87,

DEC 87 102P

PERSONAL AUTHORS: Antolovich, Stephen D.

CONTRACT NO. AFOSR-84-0101

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-88-0176

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this study is to determine the effect of microstructural properties on the fatigue crack propagation (FCP) response of nickel base superalloys. This report describes the results of four experimental alloys containing various amounts of aluminum, titanium, and molybdenum. Chemistry, precipitate size, and grain size were varied to produce systematically controlled microstructures. The four alloys were characterized for chemical composition, microstructure, tensile properties, low cycle fatigue (LCF), and FCP resistance. The FCP tests were performed under constant load (increasing K) conditions in air at a stress ratio (R) of 0.1 and 0.8. Closure loads were measured with a clip gage, back-face strain gage, and a laser extensometer. Keywords: Fatigue crack propagation, Nickel base superalloys, Microstructure, Closure, Mismatch, Anti phase boundary.

DESCRIPTORS: (U) *NICKEL ALLOYS, *SUPERALLOYS, ALUMINUM, CHEMICAL COMPOSITION, CRACK PROPAGATION, EXTENSOMETERS, FATIGUE(MECHANICS), GRAIN SIZE, LASERS, LOADS(FORCES), MICROSTRUCTURE, MOLYBDENUM, STRAIN GAGES, TENSILE PROPERTIES, TITANIUM.

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IDENTIFIERS: (U) Crack tips, FCP(Fatigue Crack Propagation), PE61102F, WUAFOSR2306A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 525 7/6

SOUTHERN ILLINOIS UNIV AT CARBONDALE DEPT OF MATHEMATICS

(U) Material Instabilities in Solids.

DESCRIPTIVE NOTE: Final technical rept. 15 Jul 86-14 Jul 87,

JAN 88 13P

PERSONAL AUTHORS: Spector, Scott J.

CONTRACT NO. AFOSR-86-0184

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-88-0125

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal investigator considered a number of mathematical problems that may help explain material failures in polymers and ductile metals. In particular, useful results were obtained concerning the initiation and dynamic growth of holes, the static instability and surface cracking of a single hole and the linearized stability of a free surface in an elastic material.

DESCRIPTORS: (U) *DUCTILITY, *ELASTIC PROPERTIES, *POLYMERS, *SOLIDS, CRACKS, DYNAMICS, GROWTH(GENERAL), HOLES(OPENINGS), LINEARITY, MATERIALS, MATHEMATICS, METALS, STABILITY, STATIC STABILITY, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

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AD-A189 518 7/4

YALE UNIV NEW HAVEN CONN

(U) Molecular Collision Processes in Gases and at Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-31 Jul 87,

DEC 87 18P

PERSONAL AUTHORS: Fenn, John B.

CONTRACT NO. F49620-85-C-0065

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0132

UNCLASSIFIED REPORT

ABSTRACT: (U) Results have been obtained by Fourier Transform Infrared Emission Spectrometry (FTIES) to determine the internal energy distribution in molecules whose states are consequent to three kinds of inelastic and/or reactive collision processes. (1) Free Jet Expansion. Gas that is vibrationally excited in the source by heating, corona discharge or chemical reaction is interrogated by FTIES after free jet expansion into vacuum. The observed marked departures from equilibrium give insight on RR, RT, RV and VV exchanges where R, T and V refer to rotational, vibrational and translational energy. (2) Inelastic Scattering from Surfaces. When free jets of CO2, CO2, N2O, and OCS are incident on a hot Pt surface the reflected molecule have enough vibrational excitation to be analyzed by FTIES. Vibrational and Rotational accommodation coefficients have been determined for these species over a range of surface temperatures. (3) Reactive Scattering from Surfaces. FTIES analysis has been carried out on nascent carbon dioxide molecules formed by the catalytic oxidation of carbon monoxide molecules incident on a Pt surface bathed in oxygen. Results indicated vibrational and rotational temperatures much higher than surface temperatures.

DESCRIPTORS: (U) *COLLISIONS, *GASES, *MOLECULAR PROPERTIES, CHEMICAL REACTIONS, ELECTRICAL CORONA, ENERGY, ENERGY TRANSFER, HEATING, INTERNAL, MOLECULES,

AD-A189 518

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REACTIVITIES, SOURCES, VACUUM, VIBRATION, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A189 517 20/11

PENNSYLVANIA STATE UNIV UNIVERSITY PARK

(U) The Euler-Bernoulli Beam Equation with Boundary Energy Dissipation.

DESCRIPTIVE NOTE: Rept. for 1 Sep 85-31 Aug 87,

JAN 88 31P

PERSONAL AUTHORS: Chen, G.; Krantz, S. G.; Ma, D. W.; Wayne, C. E.; West, H. H.

CONTRACT NO. AFOSR-85-0253, $NSF-DMS84-01297A01

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0147

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants NSF-DMS85-01306 and NSF-DMS84-03664.

ABSTRACT: (U) Many problems in structural dynamics involve stabilizing the elastic energy of partial differential equations such as the Euler-Bernoulli beam equation by boundary conditions. Exponential stability is a very desirable property such elastic systems. The energy multiplier method has been successfully applied by several people to establish exponential stability for various PDEs and boundary conditions. However, it has also been found that for certain boundary conditions the energy multiplier method is not effective in proving the exponential stability property. A recent theorem of F. L. Huang introduces a frequency domain method to study such exponential decay problems. In this paper, we derive estimates of the resolvent operator on the imaginary axis and apply Huang's theorem to establish an exponential decay result for an Euler-Bernoulli beam with rate control of the bending moment only. We also derive asymptotic limits of eigenfrequencies, which was also done earlier by P. Ridezu. Finally, we indicate the realizability of these boundary feedback stabilization schemes by illustrating some mechanical designs of passive damping devices.

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DESCRIPTORS: (U) *ELASTIC PROPERTIES, BENDING MOMENTS, BOUNDARIES, DAMPING, DISSIPATION, DYNAMICS, ENERGY, FEEDBACK, PARTIAL DIFFERENTIAL EQUATIONS, PASSIVE SYSTEMS, STABILIZATION, STRUCTURAL PROPERTIES, BEAMS(STRUCTURAL).

IDENTIFIERS: (U) Euler Bernoulli equations, Frequency domain, PE61102F, WUAFOSR2304A1.

AD-A189 517

AD-A189 516 11/4

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE

(U) High-Temperature Metal Matrix Composites.

DESCRIPTIVE NOTE: Annual rept. 15 Nov 86-30 Sep 87,

NOV 87 130P

PERSONAL AUTHORS: Thompson, A. W.; Parent, J. O.; Henein, Hani; Piehler, Henry R.; Watkins, Daniel M.

CONTRACT NO. F49620-87-C-0017

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR TR-88-0089

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with California Univ., Berkeley and Clemson Univ.

ABSTRACT: (U) The Annual Report for Year 1 of the University Research Initiative grant at Carnegie Mellon University on High-temperature Metal Matrix Structural Composites contains sections on processing, characterization, and mechanical properties. These are further divided into reports from individual tasks on powder blending and consolidation, composite performance, structure and composition of composite interfaces, fatigue crack growth, creep, and fracture behavior. Keywords: High temperature metal matrix composites, Interfaces, Composite processing, Aluminides, Titanium, Fatigue, Creep, Toughness, Atomic resolution.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *METAL MATRIX COMPOSITES, *HEAT RESISTANT MATERIALS, ALUMINIDES, BLENDING, CRACK PROPAGATION, CREEP, FATIGUE(MECHANICS), FRACTURE(MECHANICS), HIGH TEMPERATURE, MECHANICAL PROPERTIES, POWDERS, TITANIUM, TOUGHNESS, MANUFACTURING, MATHEMATICAL MODELS, MICROSTRUCTURE, THERMAL PROPERTIES, BONDING.

IDENTIFIERS: (U) Fiber orientation, PE61102F,

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WUAFOSR2306A3.

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COLORADO UNIV AT BOULDER

(U) Genetic Variation in Paraoxonase Activity and Sensitivity to Diisopropylphosphofluoridate in Inbred Mice,

87 5P

PERSONAL AUTHORS: Wehner, Jeanne M.; Murphy-Erdosh, Cynthia; Smolen, Andrew; Smolen, Toni N.

CONTRACT NO. AFOSR-85-0369

MONITOR: AFOSR
TR-87-1702

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Pharmacology Bichemistry and Behavior, v28 p317-320 1987.

ABSTRACT: (U) The mechanism underlying genetic variation in the acute and chronic responses of mice to diisopropylphospho-fluoridate (DFP) are unknown. We investigated whether variation in metabolism of organophosphates by A-esterase, as exemplified by the enzyme paraoxonase, was correlated to the degree of sensitivity to DFP in four inbred mouse strains. LD50s and plasma paraoxonase were measured in each strain. We observed genetic variation in both of these measures, but there was no significant correlation between the two measures. We conclude that plasma paraoxonase activity does not underlie genetic variation in sensitivity to the lethal effects of DFP in mice since it does not determine the degree of sensitivity or resistance to DFP.

DESCRIPTORS: (U) *GENETICS, *LETHALITY, *ORGANOPHOSPHATES, *ESTERASES, METABOLISM, MICE, REPRINTS, SENSITIVITY, VARIATIONS, RESPONSE(BIOLOGY), CHOLINESTERASE INHIBITORS, TOXICITY.

IDENTIFIERS: (U) *DFP(Diisopropylphosphofluoridate), *Paraoxonase, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 432 7/4 4/1 21/2

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-31 Aug 87,

OCT 87 22P

PERSONAL AUTHORS: Golde, Michael F.

CONTRACT NO. AFOSR-85-0166

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1725

UNCLASSIFIED REPORT

ABSTRACT: (U) Important elementary gas phase reactions have been studied by the discharge flow technique, utilizing laser induced fluorescence to detect radical species and mass spectrometry to monitor stable reaction products. Both rate constants and reaction products have been determined. The H-abstraction reactions of F atoms and of OH radicals with CH3OH favor different reaction channels: the former yields predominantly methoxy radicals (CH3O), whereas the latter strongly favors hydroxymethyl (CH2OH). The reaction of OH with CH3OH shows a large kinetic isotope effect for this channel. The kinetics of CH3O with NO resemble those of CH3O with NO2 studied previously in this lab, namely a weak positive pressure dependence and a strong inverse temperature dependence and a strong inverse temperature dependence of the second order rate coefficient. Analysis of the rate data together with direct detection of reaction products have established that atom transfer to yield HNO + CH2O is the major channel at low pressures. A brief study of the reaction of NH2 with NO has shown that OH production is a minor channel, with a branching fraction of < or = 0.04. Keywords: Chemical kinetics; Elementary reactions; Methoxy radicals; Laser induced fluorescence.

AD-A189 432

AD-A189 432 CONTINUED

DESCRIPTORS: (U) *CHEMICAL RADICALS, *COMBUSTION, *REACTION KINETICS, *GLOW DISCHARGES, ATOMS, CHANNELS, COEFFICIENTS, CONSTANTS, DETECTION, FLOW, GASES, INVERSION, ISOTOPE EFFECT, LASER INDUCED FLUORESCENCE, LOW PRESSURE, MASS SPECTROMETRY, METHANE, OXYGEN, PRESSURE, PRODUCTION, RATES, REACTANTS(CHEMISTRY), STABILITY, TEMPERATURE, TRANSFER, UPPER ATMOSPHERE, VAPOR PHASES, NITROGEN OXIDES, HYDROXYL RADICALS, ATMOSPHERIC PHYSICS.

IDENTIFIERS: (U) Hydroxymethyl, Methoxy radicals, Nitrogen monoxide, Nitrogen dioxide, PE61102F, WUAFOSR2303B1.

AD-A189 432

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 411 7/3 7/4

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Acetic Acid Decomposition on Ni(100): Intermediate Adsorbate Structures by Reflection Infrared Spectroscopy,

87 5P

PERSONAL AUTHORS: Scharpf, Eric W.; Benziger, Jay B.

CONTRACT NO. AFOSR-86-0050

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-87-1807

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Physical Chemistry, v91 n22 p5531-5534 1987.

ABSTRACT: (U) Temperature-programmed reflection absorption infrared spectroscopy (TPRAIS), in concert with reflection absorption infrared spectroscopy (RAIS), was used to follow the sequence of stable surface intermediates for the decomposition of acetic acid monomer and dimer on Ni(100). After acetic acid monomer adsorbs molecularly at 170 K, the acid hydrogen is irreversibly lost at 240 K and a bridge-bonded acetate is formed. The bridge-bonded acetate then under-goes a reversible transformation to a monodentate acetate above 320 K which eventually decomposes to CO2, C(ad), and H2 at 435 K. Acetic acid dimer adsorbs molecularly at 170 K with the hydrogen-bonded ring approximately parallel to the surface. The dimer decomposes by dehydration at 255 K to adsorbed CO, a bridge bonded acetate, and an adsorbed methyl group. The acetate decomposes to CO2, C(ad), and H2 at 440 K. The key step in the acetate decompositions is the C-C bond scission. The dynamic infrared study shows the importance of performing the spectroscopy at reaction conditions to identify the stable molecular configurations involved during the reaction. Keywords: Reflection spectroscopy; Infrared; Acetic acid; Nickel.

DESCRIPTORS: (U) *ACETATES, *ACETIC ACID, *DECOMPOSITION,

AD-A189 411

AD-A189 411 CONTINUED

*INFRARED SPECTROSCOPY, ABSORPTION SPECTRA, ACIDS, ADSORPTION, BONDED JOINTS, DEHYDRATION, DIMERS, HYDROGEN, INFRARED RADIATION, METHYL RADICALS, MONOMERS, NICKEL, AUGER ELECTRON SPECTROSCOPY, CATALYSTS, ORIENTATION(DIRECTION), CROSSLINKING(CHEMISTRY), MOLECULE MOLECULE INTERACTIONS, SYNTHESIS(CHEMISTRY), REPRINTS.

IDENTIFIERS: (U) PE61102F, AFOSR2303A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 408 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Stochastic Comparisons of Order Statistics, with Applications in Reliability.

DESCRIPTIVE NOTE: Technical rept.,

NOV 87 19P

PERSONAL AUTHORS: Kim, Jee S.; Proschan, Frank; Sethuraman, Jayaram

REPORT NO. FSU-TR-M773

CONTRACT NO. DAAL03-86-K-0094, F49620-85-C-0007

MONITOR: AFOSR, ARO
TR-87-217, 23699.16-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Also available as Rept. no. ARO-TR-D-99.

ABSTRACT: (U) This paper surveys recent advances in stochastic comparisons of order statistics along with reliability applications. Section 2 presents inequalities for linear combinations of order statistics from restricted families. Comparisons of linear combinations of order statistics from distributions F and G are obtained for/G F convex and for/G F starshaped. These results yield conservative upper and lower tolerance limits. For G exponential and F IFR or IFRA, stochastic comparisons are presented for the total time on test, used in life testing. Section 3 presents stochastic comparisons of order statistics from underlying heterogeneous distributions. Given two sets of independent components (possibly unlike), majorization conditions are given which insure that any k-out-of-n system constructed from components in the first set will have reliability at least as great as that of a corresponding system constructed from components in the second set. Since the ordered failure times of the components represent order statistics from heterogeneous distributions, the order statistics from one set of underlying distributions (F1,...,Fn) can be compared stochastically with those from another set (F1,...,Fn).

AD-A189 408 CONTINUED

DESCRIPTORS: (U) *ORDER STATISTICS, *RELIABILITY, *STOCHASTIC PROCESSES, DISTRIBUTION, HETEROGENEITY, LIFE TESTS, LIMITATIONS, LOW LEVEL, TIME, TOLERANCE, YIELD.

AD-A189 408

AD-A189 407 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Bias Reduction When There Is No Unbiased Estimate.

DESCRIPTIVE NOTE: Technical rept.,

JAN 88 8P

PERSONAL AUTHORS: Doss, Hani; Sethuraman, Jayaram

REPORT NO. FSU-TR-M777

CONTRACT NO. DAAL03-86-K-0094, F49620-85-C-0007

MONITOR: AFOSR, ARO
TR-87-219, 23699.17-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Also available as Rept. no. ARO-TR-D-101.

ABSTRACT: (U) Let phi be a parameter for which there is no unbiased estimator. This note shows that for an arbitrary sequence of estimators T superscript(k), if the bias of T superscript(k) tend to 0 then their variances must tend to infinity. Keywords: Bias reduction; Jackknife estimate of bias; Bootstrap estimate of bias.

DESCRIPTORS: (U) *BIAS, *POISSON DENSITY FUNCTIONS, ESTIMATES, REDUCTION, HILBERT SPACE.

IDENTIFIERS: (U) Bootstrap problems, Jackknife problems, Bias reduction.

AD-A189 385 11/8.2

JOHNS HOPKINS UNIV BALTIMORE MD

(U) A Fundamental Understanding of the Effect of Alloying Elements on the Corrosion Resistance of Rapidly Solidified Mg Alloys.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Nov 86-31 Oct 87,

NOV 87 74P

PERSONAL AUTHORS: Kruger, J.; Long, G. G.; Tanaka, D. K.; Joshi, A.; Makar, G. L.

CONTRACT NO. F49620-86-C-0014

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-87-1892

UNCLASSIFIED REPORT

ABSTRACT: (U) During the second year of this project progress was made in the following areas concerned with the effect of alloying elements on the corrosion resistance of RSP Mg alloys: (1) The development of the surface reflection x ray spectroscopic technique (ref1EXAFS) to carry out structural studies on the films on Mg alloys that control corrosion was completed and applied in measurements at the oxygen K-edge of surface films on high purity Mg and AZ61 Mg alloys. The existence of magnesium hydroxide on these surfaces was found. (2) Electrochemical studies of the effect of A1, An, Ce, Nd, Y, Mn, Li, and Ca in melt-spun Mg alloy ribbons on corrosion behavior were carried out. The corrosion rate decreased with increased percentage of A1 and small additions of Zn. It was found that rapid solidification improves the resistance of the alloy studied (AZ61) to localized C1- attack. (3) Surface analytical studies found that only Li and Ca in the RSP Mg alloys have a tendency to be enriched in the films on these alloys. Hydroxides and carbonates were also found in the surface films along with oxides. Keywords: Magnesium alloys, Rapidly solidified alloys, Corrosion, EXAFS, Electrochemistry, Localized corrosion, Passivity.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 38J CONTINUED

DESCRIPTORS: (U) *CORROSION RESISTANCE, *MAGNESIUM ALLOYS, *CORROSION RESISTANT ALLOYS, CARBONATES, ELECTROCHEMISTRY, HYDROXIDES, MAGNESIUM COMPOUNDS, OXIDES, RATES, SOLIDIFICATION, STRUCTURAL PROPERTIES, SYNTHESIS(CHEMISTRY), FABRICATION, ALUMINUM, ZINC, LITHIUM, CERIUM, CALCIUM, SURFACE PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A189 384 5/8 12/9

ESSEX CORP ORLANDO FL

(U) Development of Saccade Length Index of Taskload for Biocybernetic Application.

DESCRIPTIVE NOTE: Annual technical rept. 1 Nov 86-31 Oct 87,

NOV 87 33P

PERSONAL AUTHORS: May, James G.; Kennedy, Robert S.; Fowlkes, Jennifer E.

CONTRACT NO. F49620-87-C-0002

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR TR-87-1849

UNCLASSIFIED REPORT

ABSTRACT: (U) This report reviews progress made during the first year of a two year Phase II SBIR program to develop the Saccade Length Index of Mental Workload or SLIT. The ultimate goal of this effort is to develop a fully portable system to measure workload using the SLIT metric. Phase I work showed that workload and saccade length were related when workload was manipulated using an auditory tone counting task. Research conducted thus far in Phase II has replicated the Phase I results and has also shown 1) that the saccade length index is not affected by extended practice on a difficult tone counting task, and 2) that practice on a difficult tone counting task does not invalidate the saccade length measure when subjects perform less difficult levels of the same task. Preliminary results suggest that saccade length reflects workload on visual counting tasks in addition to auditory counting tasks, thus extending the possible application of SLIT to visual tasks which do not require precise visual fixation or tracking. Hardware has been purchased for the SLIT system and progress has been made on software development so that SLIT system may be automated for data collection and analyses. Keywords: Biocybernetics, Human performance.

AD-A189 385

AD-A189 384

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 384 CONTINUED

DESCRIPTORS: (U) *CYBERNETICS, *MENTAL ABILITY, *WORKLOAD, COMPUTER PROGRAMS, COUNTING METHODS, DATA ACQUISITION, HEARING, PERFORMANCE(HUMAN), TRACKING, VISION, STRESS(PSYCHOLOGY), EYE MOVEMENTS, WORK MEASUREMENT.

IDENTIFIERS: (U) Saccades, Saccadic Eye movements, PE61102F, WUAFOSR3005A1.

AD-A189 384

AD-A189 383 12/1

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) Numerical Solution of Ill Posed Problems in Partial Differential Equations.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 84-30 Sep 87,

SEP 87 27P

PERSONAL AUTHORS: Levine, Howard A.

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1917

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is concerned with several questions concerning the existence, uniqueness continuous data dependence and numerical computation of solutions of various ill posed problems in partial differential equations. Several problems involving reaction diffusion equations with and without convection terms present were studied. In the latter case the ability of finite element approximate solutions to reproduce the continuous time dynamics was investigated. In the former case a convective diffusion equation with a similar source in the boundary condition was analyzed. A fairly complete picture of the dynamics was obtained. With the source term in the equation, computations revealed a rich structure which has been partially analyzed theoretically. Several problems for reaction diffusion equations in unbounded regimes were also investigated. It was shown that under certain conditions in the rate law all nonzero solutions blow up in finite time, while for other conditions in the rate law, solutions damp out.

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *PARTIAL DIFFERENTIAL EQUATIONS, BOUNDARIES, COMPUTATIONS, CONVECTION, DIFFUSION, DYNAMICS, FINITE ELEMENT ANALYSIS, NUMERICAL ANALYSIS, RATES, SOLUTIONS(GENERAL), POTENTIAL THEORY, EIGENVALUES, CAUCHY PROBLEM.

AD-A189 383

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 383 CONTINUED

IDENTIFIERS: (U) Ill posed problems, Initial value problems, Inverse problems, PE61102F, WUAFOSR2304A4.

AD-A189 382 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Analysis of Simulated Annealing Type Algorithms.

DESCRIPTIVE NOTE: Doctoral thesis,

MAY 87 107P

PERSONAL AUTHORS: Gelfand, Saul B.; Mitter, Sanjoy K.

REPORT NO. LIDS-TH-1668

CONTRACT NO. DAAG29-84-K-0005, $AFOSR-85-0227

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1916

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant DAAL03-86-G-0208.

ABSTRACT: (U) THE ANNEALING ALGORITHM IS A POPULAR Monte-Carlo algorithm for combinatorial optimization. The annealing algorithm consists of simulating a nonstationary finite state Markov chain whose state space is the domain of the cost function, called energy, to be minimized. The degree of randomization in the annealing algorithm is controlled by a parameter, called temperature, which is slowly decreased to zero. The convergence in probability and the rate of convergence of the annealing chain for the special case of an energy function with two local minima is analyzed. The sample path properties of annealing chains (with arbitrary energy functions) are examined. A modification of the annealing algorithm which makes noisy measurements of the energy function is given. The annealing algorithm is extended for optimization on general spaces.

DESCRIPTORS: (U) *ANNEALING, *COMBINATORIAL ANALYSIS, *OPTIMIZATION, *MONTE CARLO METHOD, ALGORITHMS, SIMULATION, APPROXIMATION(MATHEMATICS), ERROR CORRECTION CODES, MATHEMATICAL ANALYSIS, COMPUTER AIDED DESIGN, COST

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 382 CONTINUED

ANALYSIS, GRAPHS, POLYNOMIALS.

IDENTIFIERS: (U) .VLSI(Very Large Scale Integration), Computer chips, Annealing type algorithms, PE61102F, WUAFOSR2304A1.

AD-A189 379 20/1

IOWA STATE UNIV AMES

(U) A Simple Computational Scheme for Determining the Sound Speed of an Acoustic Medium from Its Surface Impulse Response,

JUL 87 23P

PERSONAL AUTHORS: Sacks, Paul E.; Santosa, Fadil

CONTRACT NO. N00014-83-K-0051, $AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1908

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Journal on Scientific and Statistical Computing, v8 n4 p501-520, Jul 87.

ABSTRACT: (U) We describe an algorithm for recovering the sound speed of a one-dimensional half space from its impulse response at the boundary. Similar techniques for some related optimization problems are also discussed, and the results of numerical experiments are given. Keywords include: Inverse problem, Acoustic medium, and Wave equation.

DESCRIPTORS: (U) *ACOUSTIC VELOCITY, *WAVE EQUATIONS, ACOUSTICS, ALGORITHMS, COMPUTATIONS, INVERSION, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PULSES, RESPONSE, SURFACES, REPRINTS.

IDENTIFIERS: (U) Inverse problems, PE61102F, WUAFOSR2304A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 342 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Evolution Equations Driven by Nuclear Space Valued Martingales.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

SEP 87

PERSONAL AUTHORS: Kallianpur, G.; Perez-Abreu, V.

REPORT NO. TR-204

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1914

UNCLASSIFIED REPORT

ABSTRACT: (U) The paper presents a theory of stochastic evolution equations for nuclear space valued processes and provides a unified treatment of several examples from the field of applications. (C sub 0,1) reversed evolution systems on countably Hilbertian nuclear spaces are also investigated. Keywords: Nuclear space, Stochastic evolution; Time dependent evolution; Interacting.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, EQUATIONS, EVOLUTION(GENERAL), REVERSIBLE, TIME DEPENDENCE, TIME STUDIES, HILBERT SPACE, CONVERGENCE.

IDENTIFIERS: (U) Martingales, Hilbert nuclear space, Gelfand triplet, PE61102F, WUAFOSR2304A5.

AD-A189 342

AD-A189 341 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Convolution Metrics and Rates of Convergence in the CLT (Central Limit Theorem).

DESCRIPTIVE NOTE: Technical rept. Sep 87-Aug 88,

OCT 87 39P

PERSONAL AUTHORS: Rachev, S. T.; Yukich, J. E.

REPORT NO. TR-210

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1915

UNCLASSIFIED REPORT

ABSTRACT: (U) Let (B,) be a complete separable Banach space and let X=X (B) be the vector space of all random variables defined on a probability space (Omega, A, P) and taking values in B. It is known that metrics on X of convolution type enjoy a variety of interesting properties. In this article it is shown that convolution metrics may also by used to obtain rates of convergence in CLT's involving a stable limit law. The rates are expressed in terms of a variety of uniform metrics on X and include the total variation metric and the uniform metrics between density and characteristic functions. The results represent both an improvement and an extension of existing results. Week convergence properties of convolution metrics are also explored. Keywords: Ideal probability metrics; Convolution metrics· Rate of convergence; Stable random variables.

DESCRIPTORS: (U) *CONVERGENCE, *CONVOLUTION, BANACH SPACE, LIMITATIONS, PROBABILITY, RANDOM VARIABLES, RATES, SEPARATION, STABILITY, THEOREMS, VECTOR SPACES.

IDENTIFIERS: (U) Central limit theorem, *Convulution metrics, PE61102F, WUAFOSR2304A5.

AD-A189 341

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 301 3/2

TUFTS UNIV MEDFORD MA

(U) VLA (Very Large Array) Observations of a Solar Noise Storm,

AUG 87 10P

PERSONAL AUTHORS: Lang, Kenneth R.; Willson, Robert F.

CONTRACT NO. AFOSR-83-0019

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-87-1929

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Astrophysical Journal, v319 n1 pti p514-519, 1 Aug 87.

ABSTRACT: (U) The first Very Large Array (VLA) observations of the Sun at 92 cm wavelength (328 MHz) are presented. A solar noise storm, which lasted at least 3 hr, was detected at this wavelength; it consisted of a burstlike spikes superposed on a slowly varying background, and both components were 95% + or - 5% right-hand circularly polarized. A long-duration soft X-ray event preceded the radio radiation by 30 minutes, suggesting a disturbance moving outward at a velocity of v=78 km/s. The 92 cm noise storm was resolved with an angular resolution 9 arc sec for time intervals as short as 13 s. Snapshot maps revealed a persistent elongated source at successive peaks, with a scatter in the source position. A systematic position shift of Delta Theta > or = 15 can be produced by the Earth's ionosphere, but these effects can be removed by frequent observations of a nearby calibrator source. Previously reported trends are confirmed for a decrease in source size at higher frequencies. The new VLA results are also consistent with previous observations of noise storm polarization and height. The VLA can potentially resolve both the burst and continuum components of noise storms, while also detecting the effects of anisotropic scattering in the corona. The high angular resolution and large collecting area of the VLA may lead to the detection of the second

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harmonic of the storm plasma frequency or establish important limits to it.

DESCRIPTORS: (U) *SOLAR RADIATION, *EXTRATERRESTRIAL RADIO WAVES, *SOLAR DISTURBANCES, ANGLES, ANISOTROPY, ARRAYS, CALIBRATION, DETECTION, FREQUENCY, HIGH RESOLUTION, LONG RANGE(TIME), NOISE, PLASMAS(PHYSICS), POLARIZATION, POSITION(LOCATION), REPRINTS, SCATTERING, SHIFTING, SIZES(DIMENSIONS), SOFT X RAYS, SOURCES, SPIKES, STORMS, SUN, TIME INTERVALS, RADIO ASTRONOMY, SUN.

IDENTIFIERS: (U) *Solar noise, VLA(Very Large Array), PE61102F, WUAFOSR2311A1.

AD-A189 301

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 299 9/3

WASHINGTON UNIV SEATTLE

(U) Optical Properties of Compressible Inhomogeneous Shear Layers Relevant to High Power Lasers.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 83-31 May 87,

SEP 87 51P

PERSONAL AUTHORS: Christiansen, Walter H.

CONTRACT NO. AFOSR-83-0059

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1750

UNCLASSIFIED REPORT

ABSTRACT: (U) Shear layers and wakes are a major source of optical degradation in flow lasers. The structure of these flows has been studied experimentally with special attention given to their optical properties. Gases with different refractive indices were investigated and the effects of density ratio and mach number were measured. The time averaged optical properties of inhomogenious shear layers is reported here wherein the principle far field measurement was the strehl ratio. Modification of the apparatus of the shear is discussed. Keywords: Shear layers, Laser optical degradation, Refractive indices.

DESCRIPTORS: (U) *LASERS, *OPTICAL PROPERTIES, *REFRACTIVE INDEX, FAR FIELD, FLOW, GASES, HIGH POWER, LAYERS, MACH NUMBER, MEASUREMENT, RATIOS, SHEAR PROPERTIES, WAKE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

AD-A189 299

AD-A189 298 9/5

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Faraday-Effect Light Valve Arrays for Adaptive Optical Instruments,

87 7P

PERSONAL AUTHORS: Hirleman, E. D.; Dellenback, Paul A.

CONTRACT NO. AFOSR-84-0187

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-2010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Flow and Particle Diagnostics, Proceedings of ICALEO 1987, 1987.

ABSTRACT: (U) The ability to adapt to a range of measurement conditions by autonomously configuring software or hardware on-line will be an important attribute of next-generation intelligent sensors. This paper reviews the characteristics of spatial light modulators (SLM) with an emphasis on potential integration into adaptive optical instruments. The paper focuses on one type of SLM, a magneto-optic device based on the Faraday effect. Finally, the integration of the Faraday effect SLM into a laser diffraction particle sizing instrument giving it some ability to adapt to the measurement context is discussed.

DESCRIPTORS: (U) *FARADAY EFFECT, *LIGHT MODULATORS, *MAGNETOOPTICS, ADAPTIVE SYSTEMS, INTEGRATION, MEASUREMENT, ON LINE SYSTEMS, OPTICAL INSTRUMENTS, REPRINTS, SPATIAL DISTRIBUTION, COMPUTER PROGRAMMING, OPTICAL CIRCUITS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A189 298

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 297 7/4

PITTSBURGH UNIV PA

(U) Going for a Molecular Spin,

SEP 87 3P

PERSONAL AUTHORS: Weisburd, S.

CONTRACT NO. AFOSR-86-0107

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-87-1842

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science News, v132 n13 p193-208, 26 Sep 87.

ABSTRACT: (U) By measuring the temperature at which molecules begin to spin and by modeling the rotation quantum mechanically, the researchers determined the amount of energy needed to initiate rotation. However, Yates says they do not yet understand the force that prevents spinning at low temperatures and that orients the PF3 molecule in a very specific way relative to the nickel surface. He also notes that if the PF3 molecules are closely packed on the surface, their rotation is strongly hindered by interactions between neighboring molecules, somewhat like interlocking gears.

DESCRIPTORS: (U) *MOLECULES, *NICKEL, *QUANTUM THEORY, *ROTATION, LOW TEMPERATURE, SPINNING(MOTION), SURFACES, PHOSPHORUS COMPOUNDS, FLUORIDES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A189 297

AD-A189 280 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Predicting Transforms of Stable Noise and other Gaussian Mixtures.

DESCRIPTIVE NOTE: Technical rept. Sep 85-30 Sep 86,

JUL 87 43P

PERSONAL AUTHORS: LePage, Raoul

REPORT NO. TR-193

CONTRACT NO. F49620-85-C-0144, N00014-85-K-0150

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1808

UNCLASSIFIED REPORT

ABSTRACT: (U) Stationary stable processes that are Fourier transforms of symmetric stable independent increments processes are shown to have a.s. finite conditional expectation of X sub t given X sub s and conditional variance of X sub t given X sub(t - delta), X sub(t -2 delta). The associated conditional expectation predictors are nonlinear in (X sub s, s<t) but are mixtures of predictors of the usual type based on the Gaussian model.

DESCRIPTORS: (U) *FOURIER TRANSFORMATION, *STATISTICAL PROCESSES, *GAUSSIAN NOISE, MIXTURES, STABILITY, COVARIANCE, MATHEMATICAL PREDICTION.

IDENTIFIERS: (U) Gaussian model, PE61102F, WUAFOSR2304A5.

AD-A189 280

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 262 9/1 20/12 25/5

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) Joint Services Electronics Program.

DESCRIPTIVE NOTE: Final rept. 1 May 84-30 Apr 87,

JUN 87 13P

PERSONAL AUTHORS: Oldham, W. G.

REPORT NO. UCB/ERL-87/1

CONTRACT NO. F49620-84-C-0057

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR
TR-87-1155

UNCLASSIFIED REPORT

ABSTRACT: (U) The final report of the JSEP (Joint Services Electronics Program) in Electromagnetics, Quantum Electronics, Solid State Electronics, Materials and Devices, and Information Systems is presented.

DESCRIPTORS: (U) *ELECTRONICS, *INFORMATION SYSTEMS, *SOLID STATE ELECTRONICS, QUANTUM ELECTRONICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305.

AD-A189 262

AD-A189 228 20/5 20/3

KENT STATE UNIV OHIO LIQUID CRYSTAL INST

(U) Large Momentum Pairing in One-Dimensional Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-31 Dec 85,

SEP 87

PERSONAL AUTHORS: Allender, D. W.

CONTRACT NO. AFOSR-84-0185

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-87-1724

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective was to determine the correlation function describing large momentum pairing. A comparison of this correlation function with other correlations (such as singlet pairing, triplet pairing, charge density wae, and spin density wave) is now possible. In light of the recent discovery of high temperature superconductivity (T(C) 95K) in rare earth copper oxide materials, it is apparent that a revolution in superconductivity research is beginning.

DESCRIPTORS: (U) *SUPERCONDUCTORS, *MOLECULAR STATES, CHARGE DENSITY, CORRELATION, DENSITY, FUNCTIONS(MATHEMATICS), HIGH TEMPERATURE, MOMENTUM, ONE DIMENSIONAL, SUPERCONDUCTIVITY, WAVES, SPIN STATES, COPPER COMPOUNDS, OXIDES, RARE EARTH COMPOUNDS, CORRELATION TECHNIQUES.

IDENTIFIERS: (U) Momentum pairing, Copper oxides, PE61102F, WUAFOSR2301A8.

AD-A189 228

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 195 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Rate Constant for Cyclization/Decyclization of the Phenyl Radical,

87 3P

PERSONAL AUTHORS: Dewar, M. J.; Gardiner, W. C., Jr.; Frenklach, M.; Oref, I.

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO B2

MONITOR: AFOSR TR-87-1713

UNCLASSIFIED REPORT

ABSTRACT: (U) We report a theoretical study of the formation of phenyl radical by attack of a terminal vinyl radical upon a terminal ethynyl group, a reaction of importance in soot nucleation. Structures and energies were computed by the MINDO/3 method with the MOPAC programs. Standard MOPAC options were used for locating the transition structure and for computing force constants and vibrational frequencies. Rate constants for unimolecular isomerizations require an extension of standard RRKM theory. For incorporation into a modeling program the conversion from the open-chain radical (OC) to the phenyl radical (PR) has to be described by a kinetic equation.

DESCRIPTORS: (U) *PHENYL RADICALS, REPRINTS, TRANSITIONS, VINYL RADICALS, REACTION KINETICS, SYNTHESIS(CHEMISTRY), MOLECULE MOLECULE INTERACTIONS, ISOMERIZATION, CHEMICAL BONDS.

IDENTIFIERS: (U) *Unimolecular reaction rate constant, *Cyclization, PE61102F, WUAFOSR2303B2.

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AD-A189 194 7/4

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) High-Resolution Low-Energy Electron Reflection from W(100) Using the Electron Energy-Loss Spectrometer: A Step Towards Quantitative Analysis of Surface Vibrational Spectra,

AUG 87 5P

PERSONAL AUTHORS: Erskine, J. L.

CONTRACT NO. AFOSR-86-0109

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-87-1642

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Vacuum Science and Technology A, v5 n4 p435-439 Aug 87.

ABSTRACT: (U) High resolution low energy electron reflection measurements and electron energy loss measurements for clean W(100) and for the hydrogen saturated phase (B(1)) on W(100) are reported. The ability to perform both low energy reflectance, low energy electron diffraction, and high resolution electron energy loss experiments on the same crystal using the same electron optics permits several novel experiments. For example, it is possible to quantitatively test the dipole scattering mechanism and examine dipole and impact loss cross sections under precisely defined scattering conditions (i.e., under diffracted beam emergence conditions or at energies corresponding to reflectance resonance conditions). Under certain scattering conditions, the 'dipole' scattering selection rule is shown to break down. Suitable modifications of the electron optics control electronics also permit direct measurements of the cross-section energy dependence of vibrational losses. These new features represent an important step towards quantitative applications of vibrational spectroscopy based on comparing electron energy loss spectroscopy signals from chemisorbed species on different crystal surfaces. Keywords: Surface

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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chemistry, Hydrogen interaction, Metals, Vibrational spectroscopy, Molecular interactions, Surfaces.

DESCRIPTORS: (U) *ELECTRON ENERGY, *ELECTRON SPECTROSCOPY, *HYDROGEN, *SPECTROSCOPY, *SURFACE CHEMISTRY, *VIBRATIONAL SPECTRA, CONTROL, CROSS SECTIONS, CRYSTALS, DIFFRACTION, DIPOLES, ELECTRON DIFFRACTION, ELECTRON OPTICS, ELECTRONICS, ELECTRONS, ENERGY, HIGH RESOLUTION, INTERACTIONS, LOSSES, LOW ENERGY, MEASUREMENT, METALS, MOLECULE MOLECULE INTERACTIONS, QUANTITATIVE ANALYSIS, REFLECTANCE, REFLECTION, RESONANCE, SATURATION, SCATTERING, SURFACES, VIBRATION.

IDENTIFIERS: (U) WUAFOSR2917A2, PE61102F.

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TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) High-Resolution Electron-Energy-Loss Spectroscopy of Hydrogen Chemisorption at Nb(100) Surfaces: Evidence for Subsurface Absorption Sites,

OCT 86 5P

PERSONAL AUTHORS: Li, Ying; Erskin, J. L.; Diebold, Alain C.

CONTRACT NO. AFOSR-86-0109

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-87-1641

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v34 n8 p5951-5954, 15 Oct 86.

ABSTRACT: (U) The interaction of hydrogen with Niobium(100) surfaces has been studied by use of high-resolution electron energy loss spectroscopy, low energy electron diffraction, and work-function measurements. Experimental results indicate that hydrogen absorbs on Nb(100) at tetrahedral sites below the surface. Hydrogen in these subsurface sites exhibits reversible temperature-dependent effects compatible with the self-trapped subsurface sites proposed to account for the novel kinetics of hydrogen uptake by Nb. Keywords: Chemisorption, Hydrogen interactions with metals hydrogen diffusion; Vibrational spectroscopy.

DESCRIPTORS: (U) *ELECTRON DIFFRACTION, *HYDROGEN, *NIOBIUM, *ABSORPTION, CHEMISORPTION, DIFFUSION, INTERACTIONS, KINETICS, LOW ENERGY, METALS, REVERSIBLE, SITES, SPECTROSCOPY, SUBSURFACE, TEMPERATURE, VIBRATIONAL SPECTRA, SITE SELECTION, ELECTRON SPECTROSCOPY.

IDENTIFIERS: (U) EELS(Electron Energy Loss Spectroscopy), PE61102F, WUAFOSR2917A2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 192 7/4

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Summary Abstract: Surface Vibrational Resonances and the Order-Disorder Transformation of the W(100) Surface,

JUN 86 3P

PERSONAL AUTHORS: Woods, J. P.; Erskine, J. L.

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-87-1640

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Vacuum Science and Technology A, v4 n3 p1414-1415 May/Jun 86.

ABSTRACT: (U) The vibrational properties of clean W(100) surfaces have been studied as a function of temperature using electron energy loss spectroscopy. an intrinsic phonon mode on the clean surface appears at low temperature and vanishes above room temperature. This surface phonon appears to be related to the order-disorder transformation (A c(2x2) structure exists at low temperature), and offers interesting prospects for studying the transformation. Keywords: Surface Physics, Surface Chemistry, Vibrational Spectroscopy, Surface Phonons, Phase Transformation.

DESCRIPTORS: (U) *PHASE TRANSFORMATIONS, *PHONONS, *SURFACES, *VIBRATION, ELECTRON ENERGY, ELECTRON SPECTROSCOPY, LOW TEMPERATURE, PHYSICAL PROPERTIES, PHYSICS, RESONANCE, ROOM TEMPERATURE, SPECTROSCOPY, SURFACE CHEMISTRY, VIBRATIONAL SPECTRA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A2.

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AD-A189 191 7/3

STATE UNIV OF NEW YORK AT BINGHAMTON DEPT OF CHEMISTRY

(U) Di-pi Methane-Like Photorearrangement of Dimesity(Mesitylethynyl)Borane: Synthesis, Structure, and Aromaticity of Trimesitylborirene,

87 4P

PERSONAL AUTHORS: Eisch, John J.; Shafii, Babak; Rheningold, Arnold L.

CONTRACT NO. AFOSR-85-0108

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1643

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v109 n8 p2526-2528 1987.

ABSTRACT: (U) The first crystalline borirene (boracyclopropene) has been prepared by the photochemically induced di-pi-methane-like rearrangement of dimesityl(mesitylethynyl) borane into trimesityl-borirene. The structure of the latter compound was confirmed by X-ray crystallography, which showed the central C2B ring as an equilateral triangle, within experimental error, having atom separations of 1.42 A. The compound is most resistant to oxidation but can be cleaved with glacial acetic acid with the formation of (Z) -1,2-dimesitylethene. The borirene forms a weak complex with pyridines and thereby displays a marked bathochromic shift in such donors. The synthesis of this compound in this novel photochemical way opens up the availability of borirenes and should aid the formation of related, high energy organoboranes and carboranes. Keywords: Organoboranes, Unsaturated boracyclopolyenes, Aromaticity, X ray crystal structure, Boracyclopropenes, Oxidizability, Cleavage, Bronsted acids, Electronic spectral shifts, Boranes.

DESCRIPTORS: (U) *BORANES, *CARBORANES, *CRYSTAL STRUCTURE, *ORGANOBORANES, ACETIC ACID, CLEAVAGE,

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CRYSTALLOGRAPHY, CRYSTALS, ELECTRONICS, GLACIERS, HIGH ENERGY, LOW STRENGTH, OXIDATION, PHOTOCHEMICAL REACTIONS, PYRIDINES, RESISTANCE, SHIFTING, SPECTRA, SYNTHESIS(CHEMISTRY), X RAYS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A189 176 12/3

ILLINOIS UNIV AT URBANA DEPT OF MATHEMATICS

(U) Examples of Nonunique Maximum Likelihood Estimators,

AUG 85 3P

PERSONAL AUTHORS: Dharmadhikari, Sudhakar; Joag-Dev, Kumar

CONTRACT NO. AFOSR-84-0208

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-87-1259

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The American Statistician, v39 n3 p199-200 Aug 85.

ABSTRACT: (U) Examples are presented in which the maximum likelihood estimators do not form an interval. A condition of strict logconvexity plays an important role.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, *PROBABILITY DENSITY FUNCTIONS, REPRINTS, CAUCHY PROBLEM.

IDENTIFIERS: (U) Logconvexity, Ploya frequency function, Unimodal distribution functions, PE61102F, WUAFOSR2304K3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 169 12/3

OHIO STATE UNIV COLUMBUS

(U) Independent or Dependent Competing Risks: Does It Make a Difference.

DESCRIPTIVE NOTE: Journal article 1 Oct 85-31 Oct 86, 87 36P

PERSONAL AUTHORS: Klein, John P.; Moeschberger, M. L.

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1694

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. Communications in Statistics, Part A: Theory and Methods, Part B: Simulation and Computation, Part C. Stochastic Models, v16 n2 p507-533 1987.

ABSTRACT: (U) This article investigates the consequences of departures from independence when the component lifetimes in a series system are exponentially distributed. Such departures are studied when the joint distribution is assumed to follow either one of the three Gumbel bivariate exponential models, the Downton bivariate exponential model, or the Oakes bivariate exponential model. Two distinct situations are considered. First, in theoretical modeling of series systems, when the distribution of the component lifetimes is assumed, one wishes to compute system reliability and mean system life. Second, errors in parametric and nonparametric estimation of component reliability and component mean life are studied based on life-test data collected on series systems when the assumption of independence is made erroneously. In both instances, one may be appreciably misled by falsely assuming independent component lifetimes. The amount of error incurred depends upon the correlation between lifetimes and the relative mean life of the two components. In the modeling problem, the level of reliability and the length of mean system

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life also affects the error. In the estimation problem sample size may be influential in determining the magnitude of the error. Keywords: Reprints; Oakes bivariate exponential; Competing risks; Component life; Modeling series system; Robustness studies; System reliability; Gumbel bivariate exponential; Downton bivariate exponential.

DESCRIPTORS: (U) *RISK, *PROBABILITY DENSITY FUNCTIONS, *PARAMETRIC ANALYSIS, DISTRIBUTION, ESTIMATES, LIFE TESTS, MODELS, NONPARAMETRIC STATISTICS, RELIABILITY, REPRINTS, LIFE EXPECTANCY(SERVICE LIFE), EXPONENTIAL FUNCTIONS.

IDENTIFIERS: (U) Gumbel bivariate exponential, Downton bivariate exponential, Oakes bivariate exponential, Gumbel probability distribution, PE61102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 124 6/3

MARYLAND UNIV BALTIMORE COUNTY CATONSVILLE DEPT OF MATHEMATICS

(U) Free Boundary Problems Arising in the Control of a Flexible Robot Arm,

SEP 87 9P

PERSONAL AUTHORS: Seidman, Thomas I.

CONTRACT NO. AFOSR-87-0190

MONITOR: AFOSR TR-87-1558

UNCLASSIFIED REPORT

ABSTRACT: (U) Modeling of a flexible robot arm mounted at a prismatic joint leads to a moving boundary problem. In a control-theoretic context with joint motion as control, these become free boundary problems. Some problems are discussed for transverse vibration (the beam equation) but the principal result is an exact controllability theorem for longitudinal vibration (the wave equation). Keywords: Free boundary, Robot arm, Prismatic joint, Beam equation, Feedback, Wave equation, Exact controllability.

DESCRIPTORS: (U) *CONTROL, *FLEXIBLE STRUCTURES, *ROBOTS, BOUNDARIES, BOUNDARY VALUE PROBLEMS, MOTION, PRISMATIC BODIES, THEOREMS, TRANSVERSE, VIBRATION, WAVE EQUATIONS, HAMILTONIAN FUNCTIONS.

IDENTIFIERS: (U) Prismatic joints, ARMS(Mechanical).

AD-A189 123 12/9 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Sensitivity Reduction Over a Frequency Band,

JUL 87 24P

PERSONAL AUTHORS: Ohta, Yoshito; Tadmor, Gilead; Mitter, Sanjoy K.

REPORT NO. LIDS-P-1684

CONTRACT NO. DAAG29-84-K-0005, DAAL03-86-K-1071

MONITOR: AFOSR TR-87-1329

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers the problem of reducing the sensitivity of a possibly infinite dimensional linear single-input single-output system over a finite frequency interval by feedback. Specifically the following are proven: (i) if one wants to bound the overall sensitivity, the existence of a nontrivial inner part inhibits the reduction of the sensitivity over the interval: (ii) in a system that is continuous and has at most countably many zeros on the imaginary axis, one can reduce the sensitivity over the interval arbitrarily small while the overall sensitivity is kept bounded if and only if the system is outer and has no zeros on the interval. These extend results for rational transfer functions.

DESCRIPTORS: (U) *RATIONAL FUNCTIONS, *SENSITIVITY, *TRANSFER FUNCTIONS, FREQUENCY, FREQUENCY BANDS, INTERVALS, REDUCTION.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 114 7/3 7/4 21/2

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Fuels Combustion Research.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

OCT 87 16P

PERSONAL AUTHORS: Dryer, Frederick L.; Glassman, Irvin; Williams, Forman A.

CONTRACT NO. AFOSR-86-0240

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1894

UNCLASSIFIED REPORT

ABSTRACT: (U) The DOD URIP equipment grant received by the Fuels Combustion Research Group has been used, in accord with the original intent of the award, to update an advance the analytic capabilities of the combustion laboratories. The newly purchased gas and liquid chromatographic instrumentation have become the center pieces of a DOD supported analytic facility that was recently shown to the Chairman of the Joint Chiefs of Staff, Admiral William J. Crowe, Jr. as an example of DOD supported research in the School of Engineering. The chemical analysis instrumentation in the facility as well as the boron particle sizing and visualizing devices that have also been purchased are described briefly in this final report. Photographs of the installed equipment are used to facilitate the description of the various pieces of instrumentation. Keywords: Combustion products, Video equipment; Helium neon lasers.

DESCRIPTORS: (U) *COMBUSTION, *COMBUSTION PRODUCTS, *FUELS, *CHROMATOGRAPHIC ANALYSIS, *HYDROCARBONS, BORON, CHEMICAL ANALYSIS, HELIUM NEON LASERS, INSTRUMENTATION, PARTICLE SIZE, GAS CHROMATOGRAPHY, LIQUID CHROMATOGRAPHY, COMPUTER AIDED DIAGNOSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

AD-A189 114

AD-A189 111 14/2 15/5

ILLINOIS UNIV AT URBANA DEPT OF METALLURGY AND MINING ENGINEERING

(U) Request for an Analytical Transmission Electron Microscope.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Jun 87,

OCT 87 3P

PERSONAL AUTHORS: Fraser, Hamish L.

CONTRACT NO. AFOSR-86-0212

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-87-2029

UNCLASSIFIED REPORT

ABSTRACT: (U) A request was made in response to the DoD/URIP University Equipment Program. At that time, an advanced analytical transmission electron microscope was requested. Following the award of funds, the microscope has been chosen, ordered and is to be delivered shortly. It will be in essence the most advanced microscope of it's kind. The choice of a Philips CM12 was made, since it was felt that this microscope would be able to fulfill the needs of the research effort to which it will be applied. A supplemental report on the performance of this microscope will be made to the technical monitor after some period of operation.

DESCRIPTORS: (U) *ELECTRON MICROSCOPES, *GOVERNMENT PROCUREMENT, SELECTION, USER NEEDS, ELECTRON MICROSCOPES, MICROSCOPES, MONITORING, TRANSMITTANCE, UNIVERSITIES.

IDENTIFIERS: (U) Transmission electron microscopes, WUAFOSR2917A3, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 107 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) Estimating System and Component Reliabilities under Partial Information on Cause of Failure.

DESCRIPTIVE NOTE: Journal article,

NOV 87 19P

PERSONAL AUTHORS: Guess, Frank M.; Usher, John S.; Hodgson, Thom J.

REPORT NO. TR-136

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1864

UNCLASSIFIED REPORT

ABSTRACT: (U) Estimating component reliabilities along with the system reliability frequently requires using lifetimes from the system level. Due to cost and time constraints, however, the exact cause of system failure may be unknown. Instead, it may only be ascertained that the cause of failure is due to one component in a subset of components, e.g., the subset forms a subsystem. Confronted with such data, this article discusses how to exploit fully the available information using a maximum likelihood approach. We extend and clarify the useful work of Miyakawa (1984). A small Monte Carlo study indicates the helpfulness of this approach. Keywords: Reliability data bases.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, *RELIABILITY, COSTS, DATA BASES, FAILURE, MONTE CARLO METHOD, ESTIMATES, LIFE EXPECTANCY(SERVICE LIFE).

IDENTIFIERS: (U) Censoring, WUAFOSR2304A5, PE61102F.

AD-A189 107

AD-A189 101 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Intramolecular (2 + 2) Cycloadditions of Ketenes to Carbonyl Groups. A Novel Synthesis of Substituted Benzofurans,

87 7P

PERSONAL AUTHORS: Brady, William T.; Giang, Yun-Seng F.; Marchand, Alan P.; Wu, An-Hsiang

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1803

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v52 n15 p3457-3461 1987.

ABSTRACT: (U) Intramolecular cycloadditions of ketenes derived from (o-carbonylphenoxy)acetic acids to carbonyl groups have been utilized for the synthesis of substituted benzofurans. Three methods have been employed to generate ketenes in these systems: (i) Method A: base-promoted elimination of hydrogen chloride from (o-carbonylphenoxy)acetyl chlorides; (ii) Method B: reaction of triethylamine with (o-carbonylphenyoxy)acetyl p-tolunesulfonates, (R2CHC(O)OTs), generated in situ via reaction of (o-carbonylphenoxy)acetic acids with p-tolunesulfonyl chloride); (iii) Method C: reaction of triethylamine with esters generated in situ via reaction of (o-carbonylphenoxy)acetic acids with 2-chloro-1-methylphyridinium iodide (Mukaiyama's reagent). Reaction of triethylamine with (2-formylphenoxy)phenylacetyl chloride (Method A), when performed in the presence of excess cyclopentadiene, afforded the corresponding intermolecular (2 + 2) cycloadduct, 7-(2-formylphenoxy)-7-phenylbicyclo(3.2.0)hept-2-en-6-one, thereby providing independent evidence for the fact that a ketene is indeed generated in this reaction.

DESCRIPTORS: (U) *ACETYL CHLORIDE, *CYCLOPENTENES,

AD-A189 101

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 101 CONTINUED

*ESTERS, *KETENES, *PENTADIENES, ACETIC ACID, ACIDS, AMINES, CHEMICAL AGENTS, ETHYL RADICALS, HYDROGEN CHLORIDE, REPRINTS, RESPONSE.

IDENTIFIERS: (U) PE61102, WUAFOSR2303BL.

AD-A189 100 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Structure of a Novel C sub 11 H sub 12 N sub 2 O sub 3 Cage Molecule,

87 5P

PERSONAL AUTHORS: Watson, William H.; Marchand, Alan P.; Dave, Paritosh R.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1805

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystal, vC43 p1569-1571 1987.

ABSTRACT: (U) The structure of N-hydroxy-3-nitro-4-azahexacyclo dodecane, C11H12N2O3, has been determined by single crystal X-ray structural analysis.

DESCRIPTORS: (U) *POLYCYCLIC COMPOUNDS, *DODECANE, *MOLECULAR STRUCTURE, REPRINTS, ENERGETIC PROPERTIES, NITRO RADICALS, HYDROXYL RADICALS, CRYSTALLOGRAPHY, X RAY DIFFRACTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A189 101

AD-A189 100

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 099 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Syntheses of Nitro-Substituted 2,3,4,8-Tetraphenylpentacyclo(5.3.0.0(2,5).0(3,9).0(4,8)) decanes.

87 4P

PERSONAL AUTHORS: Marchand, Alan P.; Annapurna, G. S.; Vidyasagar, V.; Flippen-Anderson, Judith L.; Gilardi, Richard

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1836

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v52 n21 p4781-4783 1987.

ABSTRACT: (U) The syntheses of three new polynitro-1,3-bishomocubanes are described: 2,3,4,8-tetraphenyl-anti-6-anti-10-dinitro-pentacyclo (3), 2,3,4,8-tetraphenyi-6,6,-anti-10-tetranitro-pentacyclo decane (4) and 2,3,4,8-tetraphenyl-6,6,10,10-tetranitropentacyclo decane (5). Only poor quality crystals of 3 could be obtained via fractional recrystalliztion from methanol; nevertheless, a definitive strucutre could be obtained by single crystal X-ray structural analysis that unequivocally establishes the anti-6-anti-10 configuration for the carbon-nitrogen dioxide groups in 3. In addition, the single crystal X-ray structural analysis of 4 is reported.

DESCRIPTORS: (U) *DECANES, *CYCLIC COMPOUNDS, CARBINOLS, NITRO RADICALS, PHENYL RADICALS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382.

AD-A189 099

AD-A189 098 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Syntheses of New Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))u ndecanes: A Novel Synthesis of Hexacyclo(6.2.1.1(3,6).0(2,7).0(4,10).0(5,9))dodecane (1,3-Bishomopentaprismane).

86

PERSONAL AUTHORS: Marchand, Alan P.; Wu, An-Hsiang

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1840

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v51 n10 p1897-1900 1986.

ABSTRACT: (U) Several new derivatives of the pentacyclo-undecane system have been synthesized. Thus, diketone 2 could be converted to enone 3 in two ways: (i) in 69% yield via Wadsworth-Emmons reaction with the ylide derived from triethyl phosphonoacete, and (ii) in 50% overall yield via Reformatsky reaction to afford 4 followed by conversion of 4 to the corresponding mesylate and subsequent DBU-promoted elimination of methanesulfonic acid from this intermediate. Reduction of 3 with sodium borohydride-methyl hydroxide hydrogenation of 3 afforded 6 (88%). Reduction of 6 with NaBH4-MeOH afforded a mixture of lactone 7 (25%) and lactol 8 (40%); presumably 8 is formed via further reduction of 7 with excess sodium borohydride. The structure of 8 was established via dehydration to the corresponding vinyl ether, 9 (79%). Flash vacuum pyrolysis of 7 at 700 C resulted in formation of 1 (25%). This novel reaction constitutes the first example wherein pyrolysis of substituted sigma-caprolactone results in fragmentation with elimination of carbon dioxide and concomitant formation of a substituted cyclopentane.

DESCRIPTORS: (U) *DODECANE, *ETHERS, *SODIUM

AD-A189 098

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 098 CONTINUED

BOROHYDRIDES, *SULFONIC ACIDS, *VINYL RADICALS, *HEXYL RADICALS, CARBON DIOXIDE, DEHYDRATION, ELIMINATION, FLASHES, FRAGMENTATION, METHANES, PYROLYSIS, VACUUM, REPRINTS, SYNTHESIS(CHEMISTRY), CYCLIC COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A189 098

AD-A189 097 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) 3-(P-Cyanophenoxy)quadricyclane and a Redetermination of the Structure of a Hexachloroquadricyclane Dicarboxylate,

87 6P

PERSONAL AUTHORS: Watson, William H.; Tavanaiepour, Iraj; Marchand, Alan P.; Dave, Paritosh R.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1804

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystal, vC43 p1356-1359 1987.

ABSTRACT: (U) The first single crystal X ray structure of a substituted quadricyclane was reported recently. Surprisingly, two C-C bond lengths in which symmetry considerations suggest should be identical are reported to be nonequivalent. It was suggested that repulsive nonbonded interactions between the carbonyl oxygen atom in the C(1) ester group and the adjacent carbon-chlorine bond, C(7)-C1, might be responsible for this result. The structure has been redetermined and, in fact, the chemically equivalent bonds are statistically equivalent.

DESCRIPTORS: (U) *CARBONYL COMPOUNDS, *CARBOXYLIC ACIDS, *CYCLIC COMPOUNDS, *CHLORINE COMPOUNDS, *HEXYL RADICALS, ATOMS, OXYGEN, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A189 097

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A189 014 20/4

STANFORD UNIV CA

(U) Research on Flow Control.

DESCRIPTIVE NOTE: Annual rept. Oct 86-Oct 87,

OCT 87 34P

PERSONAL AUTHORS: Reynolds, W. C.

CONTRACT NO. F49620-86-K-0020

PROJECT NO. 3396

TASK NO. A1

MONITOR: AFOSR
TR-87-1904

UNCLASSIFIED REPORT

ABSTRACT: (U) This report outlines a coordinated new set of research programs on flow control. The work is being carried out by a team of experts in fluid mechanics and automatic control. Jets, turbulent boundary layers near separation, and delta wing flows form the basis for these studies, aimed primarily at developing fundamentals needed for active control of flows of technical interest. Keywords: Boundary layer control; Turbulent jets; Unsteady boundary layers; Delta wing flows.

DESCRIPTORS: (U) *BOUNDARY LAYER CONTROL, *JET FLOW, *TURBULENT FLOW, AUTOMATIC, CONTROL, DELTA WINGS, FLOW, FLUID MECHANICS, RESEARCH MANAGEMENT, UNSTEADY FLOW, TURBULENT BOUNDARY LAYER, FLOW SEPARATION, BOUNDARY LAYER.

IDENTIFIERS: (U) Flow control, PE61103F, WUAFOSR3396A1.

AD-A188 729 7/2 7/4

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) High-Temperature Photoelectron Spectroscopy: A Study of the Alkaline Earth Oxides SrO and BaO,

82 7P

PERSONAL AUTHORS: Dyke, J. M.; Feher, M.; Gravenor, B. W.; Morris, A.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1666

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 n17 p4476-4481 1987.

ABSTRACT: (U) Vacuum ultraviolet photoelectron spectra of vapor-phase Strontium Oxide and Barium Oxide have been recorded and the spectra interpreted by ab initio molecular orbital calculations and Hartee-Fock-Slater calculations. The first band onsets of BaO and SrO have been measured as 6.46 + or - 0.07 and 6.60 + or - 0.05 eV, respectively, and these lead to upper limits of the dissociation energies, Doo in BaO +(X2 signat +) and SrO+(X2 signat +) of 4.37 + or - 0.08 and 3.36 + or - 0.14 eV. Chemielectron spectra are presented for the BaO + H20 and SrO + H20 reactions.

DESCRIPTORS: (U) *BARIUM OXIDES, *OXIDES, *PHOTOELECTRON SPECTRA, *STRONTIUM, ALKALINE EARTH OXIDES, CHEMICAL DISSOCIATION, COMPUTATIONS, ENERGY, HIGH TEMPERATURE, MOLECULAR ORBITALS, VACUUM ULTRAVIOLET RADIATION, VAPOR PHASES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 680 20/4

LEHIGH UNIV BETHLEHEM PA DEPT OF MECHANICAL ENGINEERING AND MECHANICS

(U) The Xi Function.

DESCRIPTIVE NOTE: Interim rept. Jul 85-Jan 86,

JAN 86 34P

PERSONAL AUTHORS: Walker, James D.; Scharnhorst, Richard K.

REPORT NO. FM-9

CONTRACT NO. F49620-85-C-0108

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1715

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is a compendium of properties of a mathematical function (the Xi function) which arises in the modeling of turbulent boundary-layer flows near solid walls. The Xi function is formally defined as a triple integral which cannot be easily expressed in terms of elementary or known special functions. Thus series and asymptotic expansions are developed here as well as a table of integrals (most of which are indefinite). The function and its derivative are tabulated correct to ten significant figures. A FORTRAN function routine for the calculation of Xi(x) and Xi (x) is also given. Keywords: Turbulent boundary layers; Wall layer models; Wall functions.

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, ASYMPTOTIC SERIES, FORTRAN, FUNCTIONS(MATHEMATICS), INTEGRALS, LAYERS, TABLES(DATA), WALLS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) XI functions.

AD-A188 680

AD-A188 678 6/11 6/15

ISTITUTO DI RICERCHE FARMACOLOGICHE MARIO NEGRI MILAN (ITALY)

(U) 2.3.7.8-Tetrachlorodibenzo-p-Dioxin Induced Immunosuppression: Its Possible Alteration by In Vivo Administration of Specific Hepatic Enzyme Inducers.

DESCRIPTIVE NOTE: Final rept. 1 May 85-30 Apr 87,

JUN 87 35P

PERSONAL AUTHORS: Vecchi, Annunciata

CONTRACT NO. AFOSR-85-0196

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-87-1411

UNCLASSIFIED REPORT

ABSTRACT: (U) The possible alterations of TCDD toxicity induced by treatments with cytochrome P-450 inducers have been investigated in mice. TCDD toxicity has been evaluated in terms of immunosuppression and hepatic enzyme induction. Drugs able to interfere with the immune response, usually increased the level of inhibition of immune responses when given at the same time as TCDD. Treatment with 3-Methylcholanthrene before or after TCDD always resulted in additive immunosuppressive effect. Similar results were observed in enzymatic studies. In TCDD-TCDF combination when TCDD was given 2 day before and after TCDF, the effect observed in animals treated with both toxins usually was not statistically different from the effects (inhibition of immune parameters or enzymatic induction) caused by the most active compound used in that condition. Time-course experiments were consistent with the conclusion that inducers usually did not modify TCDD toxicity. If inducers had toxic effects by themselves, the effect of combined treatments was the sum of the effect of each drug.

DESCRIPTORS: (U) *DRUGS, *IMMUNOSUPPRESSION, *DIOXINS, ENZYMES, IMMUNITY, IN VIVO ANALYSIS, LIVER, MICE, RESPONSE(BIOLOGY), TOXICITY, TOXINS AND ANTITOXINS.

AD-A188 678

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 678 CONTINUED

IDENTIFIERS: (U) Tetrachlorodibenzo dioxin, Hepatic inducers, Enzyme inducers, Cholanthrene/3-methyl, Naphtoflavone/Beta, Dibenzofuran/2-3-7-8-tetrachloro, TCDD(Dioxin/2-3-7-8-Tetrachlorodibenzo-P), Dioxin/2-3-7-8-Tetrachlorodibenzo-P, Phenobarbitol.

AD-A188 674 7/3 20/5

CALIFORNIA INST OF TECH PASADENA DEPT OF CHEMISTRY

(U) Real-Time Femtosecond Probing of 'Transition States' in Chemical Reactions,

AUG 87 5P

PERSONAL AUTHORS: Dantus, Marcos; Rosker, Mark J.; Zewail, Ahmed H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1711

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n4 p2395-2397, 15 Aug 87. Presented at the European Workshop on Molecular Spectroscopy and Photon Induced Dynamics (4th) in Oxford on 13-16 Apr 87.

ABSTRACT: (U) Femtosecond probing and application to ICN yields I + CN is reported. Keywords: Reprints; Cyanide, Iodine; Femtosecond time; Transition states; Chemical reactions.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *IODINE, *CYANIDES, *ELECTRON TRANSITIONS, REPRINTS, MOLECULAR STATES, ELECTRONIC STATES, CHEMICAL DISSOCIATION, CHEMICAL BONDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 657 11/4

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING

(U) Cement Paste Matrix Composite Materials Center.

DESCRIPTIVE NOTE: Annual rept. no. 1, 29 Oct 86-29 Oct 87,

OCT 87 16P

PERSONAL AUTHORS: Young, J. F. Berger, R. L.

CONTRACT NO. F49620-87-C-0023

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR
TR-87-1902

UNCLASSIFIED REPORT

ABSTRACT: (U) The report describes the first year implementation of the Center for Excellence on Cement Paste Matrix Composite Materials. Topics include organization and administration, equipment acquisitions, personnel and the development of a comprehensive research program. Preliminary results on projects involving processing of MDF cements and the electrical properties of DSP cements are presented. Keywords: Cementitious materials, Cement pastes, Flexural strength.

DESCRIPTORS: (U) *CEMENTS, *COMPOSITE MATERIALS, *MATRIX MATERIALS, *PASTES, ACQUISITION, ELECTRICAL PROPERTIES, MATERIALS.

IDENTIFIERS: (U) PE61103F.

AD-A188 657

AD-A188 558 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Mechanism of the Cope Rearrangement.

87 20P

PERSONAL AUTHORS: Dewar, Michael J.; Jie, Caoxian

CONTRACT NO. AFOSR-86-0022, $NSF-CHE82-17948

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1712

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v109 n20 p5893-5900 1987.

ABSTRACT: (U) AM1 calculations for the Cope rearrangements of 1,5-hexadiene (1) and its 2-phenyl (6), 3-phenyl (9), 3-methyl (15), 2,4-diphenyl (10), and 2,5-diphenyl (11) derivatives, via chair transition states, support the Doering biradicaloid mechanism previously predicted by MINDO/3. The relative rates for 1,6,9 and 15 are reproduced closely, the calculated heats of activation being uniformly too large by 3.35 kcal/mol. Larger deviations for 10 and 11 can be attributed to solvent effects and experimental error. The degenerate rearrangements of 1,6, and 11 were predicted to involve 1, 5-cyclohexylene biradicaloids as marginally stable intermediates, the lengths of the C1C6 and C3C4 bonds being 1.60-1.65 A. The other rearrangements were predicted to be concerted but not synchronous. Calculations for 1 and 6 with the C1C6 and C3C4 bond lengths set equal to 2.06 A, as expected for a synchronous transition state, predicted retardation by phenyl as predicted by PMO theory. Deuterium kinetic isotope effects calculated for 1,6, and 11 agreed with Gajewski's measurements, within the limits of error of the calculations and experiments.

DESCRIPTORS: (U) *KINETICS, *DIENES, *HEXYL RADICALS, ACTIVATION, CHARRING, DEUTERIUM, ERRORS, ISOTOPES, PHENOLS, RATES, REPRINTS, RETARDATION, SOLVENTS,

AD-A188 558

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 558 CONTINUED

TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382.

AD-A188 549 25/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Multiobjective Hierarchical Decision Problems in C3, IV.

DESCRIPTIVE NOTE: Final rept. 1 Jul 85-30 Jun 86,

JUN 86 4P

PERSONAL AUTHORS: Papavassilopoulos, George P.

CONTRACT NO. AFOSR-85-0254

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR TR-87-1703

UNCLASSIFIED REPORT

ABSTRACT: (U) Two main lines of research were pursued under the support of this grant. The first one was the study of control laws in the presence of many controllers, each of which has his own objective and information, the decisions of each one influence the information and objectives of the others and where the controllers ignore several of the parameters involved in the description of the system equation and objectives. Ideas from both Adaptive Control and Game Theory were combined in developing adaptive schemes for each controller, so that the behavior of the system gets closer and closer, as time goes by to the one that would result in the known parameter case. The second one concerns two more classical game problems including the optimal shooting policy on a target that tries to escape, and the optimal flashing policies of two opponents involved in a duel.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, CONTROL THEORY, DECISION MAKING, EQUATIONS, GAME THEORY, POLICIES, OPTIMIZATION.

IDENTIFIERS: (U) C3(Command Control and Communications).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 538 5/8 6/4

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) Cerebellar Purkinje Cell Activity Related to the Classically Conditioned Nictitating Membrane Response,

86 11P

PERSONAL AUTHORS: Berthier, N. E.; Moore, J. W.

CONTRACT NO. AFOSR-86-0182, $NSF-BNS85-06989

MONITOR: AFOSR
TR-87-1671

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Experimental Brain Research, v63 p311-350 1986.

ABSTRACT: (U) Because of the purported critical role of cerebellar lobule HVI in classical conditioning of the nicitating membrane response of the rabbit, we recorded extracellularly from HVI Purkinje cells (PCs) during differential conditioning. Rabbits were trained using tonal conditioned stimuli (CSs) and stimulation of the periocular region as the unconditioned stimulus (US). Many PCs responded to the US, the most frequently observed being a burst of simple spikes. PCS in HVI showed a variety of responses to CSS that were related to the conditioned response (CRs). The most frequently observed response was an increase in simple spikes correlated with CRs. The activity of many of these cells antedated CRs by 20-200ms. A smaller proportion that antedated CRs. The existence of PCs that alter their firing before CRs suggests that they may be causally involved in this behavior, and in this respect they reinforce reports that lesions of HVI or its connections disrupt nicitating membrane CRs. Although complex spike activity was not generally related to the US or to CRs, a few PCs responded in relation to CRs with only complex spikes. In demonstrating CR-related activity in cerebellar PCs, this study supports theories of cerebellar learning such as those of Marr and Albus. Keywords: Cerebellar Purkinje cells; Marr-Albus theory, Reprints.

DESCRIPTORS: (U) *CONDITIONED RESPONSE, *LEARNING, *MEMBRANES(BIOLOGY), AUDIO TONES, CEREBELLUM, LESIONS,

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AD-A188 538 CONTINUED

RABBITS, REPRINTS, STIMULI, THEORY, RESPONSE(BIOLOGY), STIMULATION(PHYSIOLOGY).

IDENTIFIERS: (U) Nictitating membranes, Purkinje cells, Marr-albus theory.

AD-A188 538

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 536 12/3

WISCONSIN UNIV-MILWAUKEE

(U) A Sieve Estimator for the Mean of a Gaussian Process,

87 21P

PERSONAL AUTHORS: Beder, Jay H.

CONTRACT NO. AFOSR-84-0329

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1670

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of The Annals of Statistics, v15 n1 p59-78 1987.

ABSTRACT: (U) A new sieve estimator for the mean function m(t) of a general Gaussian process of known covariance is presented. The estimator m(t) is given explicitly from the data and has a simple distribution. It is shown that m(t) is asymptotically unbiased and consistent (weakly and in mean square) at each t, and that m is strongly consistent for m in an appropriate norm. No assumptions are made about the time parameter or the covariance. Keywords: Consistency; Gaussian dichotomy theorem; Maximum likelihood estimation; Reproducing kernel Hilbert space; sieve.

DESCRIPTORS: (U) *ESTIMATES, HILBERT SPACE, MAXIMUM LIKELIHOOD ESTIMATION, MEAN, REPRINTS, TIME, COVARIANCE, KERNEL FUNCTIONS.

IDENTIFIERS: (U) Gaussian processes, Gaussian dichotomy Theory, *Sieves(Mathematics), WUAFOSR2304A5, PE61102F.

AD-A188 536

AD-A188 526 11/2 11/4

WASHINGTON UNIV SEATTLE DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Microdesigning of Lightweight/High Strength Ceramic Materials.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 83-30 Nov 86,

AUG 87 307P

PERSONAL AUTHORS: Aksay, I. A.

CONTRACT NO. AFOSR-83-0375

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-87-1595

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of the program has been concerned primarily with the processing and characterization of low density and high strength ceramic matrix composites for structural applications. In order to achieve this goal, three main task areas have been emphasized: (i) fundamental studies in processing, (ii) processing of ceramic/metal composites, and (iii) theoretical studies. The work in the first task area consisted of experimental studies on phase transitions in colloidal systems and microstructure/nanostructure evolution during sintering. These studies dealt with the dispersion, consolidation, and sintering of ceramic powders and ceramic forming gels, in an effort to provide a fundamental understanding of key processing parameters that affect the microstructure of the material. The key contribution of these studies has been the recognition of the fact that colloidally consolidated particle compacts display hierarchical clustering due to multiple site nucleation and growth of particle clusters. Consequently, such hierarchically clustered structures display a multimodal void size distribution. The work in the second task area saw development of techniques for processing a new class of particulate based and low density ceramic metal composites composed of boron carbide aluminum and

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 526 CONTINUED

aluminum diboride aluminum composite materials. These materials exhibited high fracture toughness high fracture strength and high hardness.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *METAL MATRIX COMPOSITES, ALUMINUM, BORON CARBIDES, CLUSTERING, COLLOIDS, EXPERIMENTAL DATA, GELS, GROWTH(GENERAL), HARDNESS, LOW DENSITY, MICROSTRUCTURE, NUCLEATION, PARTICLES, PHASE TRANSFORMATIONS, POWDERS, PROCESSING, SINTERING, SITES, STRUCTURAL PROPERTIES.

AD-A188 526

AD-A188 525 20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Active Feedback Interaction with a Shear Layer.

DESCRIPTIVE NOTE: Annual progress rept. Jun 86-Jun 87,

AUG 87 28P

PERSONAL AUTHORS: Dimotakis, P. E.; Koochesfahani, M. M.

CONTRACT NO. AFOSR-84-0120

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1662

UNCLASSIFIED REPORT

ABSTRACT: (U) Study of the open-loop forcing of shear layer by a pitching airfoil resulted in three major findings: 1) It is possible to induce very large changes in the shear layer growth rate downstream of the disturbance location, while leaving the portion of the layer between the splitter plate and the disturbance location essentially unaffected; 2) Upstream forcing can be used as a means to modify the shear layer in the region upstream of the disturbance; and 3) Two different mechanisms are responsible for coupling such disturbances to the flow in the cases of upstream and downstream forcing. A separate investigation into the structure of the wake of a pitching air foil in a uniform free stream revealed that the proper choice of the pitch oscillation parameters can result in significant alterations of the wake. In particular, flow regimes corresponding to wake, jet, double-wake and mixed jet-wake structures can be generated. The magnitude of the axial flow along the wake vortices was estimated to increase approximately linearly with both the amplitude and frequency of oscillation. The closed-loop feedback phase of the project was initiated by the successful demonstration of a cancellation experiment in a forced turbulent shear layer. Keywords: Feedback control; Turbulence.

DESCRIPTORS: (U) *AIRFOILS, *FEEDBACK, *PITCH(MOTION),

AD-A188 525

AD-A188 525 CONTINUED

*TURBULENCE, AXIAL FLOW, CANCELLATION, CLOSED LOOP SYSTEMS, CONTROL, TURBULENT FLOW, FREE STREAM, FREQUENCY, INTERACTIONS, LAYERS, OPEN LOOP SYSTEMS, OSCILLATION, SHEAR PROPERTIES, VORTICES, WAKE, BOUNDARY LAYER CONTROL, PERTURBATIONS, JET FLOW, COUPLING(INTERACTION).

IDENTIFIERS: (U) Shear layers, Active feedback, Double wake, Forced shear layers PE61102F, WUAFOSR2307A2,

AD-A188 524 7/2 10/3

NORTHWESTERN UNIV EVANSTON IL

(U) Fast Protonic Conducting Solid Electrolytes.

DESCRIPTIVE NOTE: Final rept. 1 Jul 82-30 Jun 87,

87 11P

PERSONAL AUTHORS: Ratner, Mark A.; Whitmore, Donald H.

CONTRACT NO. AFOSR-82-0221

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1744

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental research on glassy and crystalline solid exlectrolytes materials has been pursued. In lithium aluminum silicate we found that the presence of disorder in the aluminosilicate framework can exert substantial effects on the conductivity of the lithium ion; in particular the activation energy for ionic motion is substantially lower in the glassy phase than in the crystalline one, despite the greater disorder in the glass. This was explained in terms of reduced effects of interionic correlation in the disordered material compared to the rigidly alternating crystal. This substantial reduction in the localizing effects of ionic correlations should be operative in all glasses, and may account for enhancements of conductivity in stoichiometric glass compositions at relatively low temperatures. Complex impedance spectroscopy, magnetic resonance, vibrational spectroscopy and differential anomalous scattering techniques have been used to study local structures in silver selenide-germanium selenide glasses. The data seems to show the coexistence of well-defined local order with typical glassy randomness. Diffusion measurements on both uranyl phosphate and beta alumina protonic electrolytes were completed using nuclear magnetic resonance spectroscopy. The results strongly suggest that the simple for the Grotthus mechanism is not operative here. A detailed study of the transport properties of the proton conducting hydrogen-

AD-A188 524 CONTINUED

uranyl-periodate-water glasses was made. The protonic conductivity and diffusivity are dependent on the partial pressure of water vapor in the surrounding atmospheric are photosensitive. Keywords: Solid electrolyte, Conductivity, Dynamic percolation, Diffusion.

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *LITHIUM, *SILICATES, *SOLID ELECTROLYTES, ACTIVATION ENERGY, ANOMALIES, CHEMICAL COMPOSITION, CONDUCTIVITY, CRYSTALS, DIFFUSION, DYNAMICS, GLASS, IMPEDANCE, IONS, LOW TEMPERATURE, MAGNETIC RESONANCE, MATERIALS, MEASUREMENT, NUCLEAR MAGNETIC RESONANCE, NUCLEAR RADIATION SPECTROSCOPY, ORDER DISORDER TRANSFORMATIONS, PARTIAL PRESSURE, PERCOLATION, REDUCTION, SCATTERING, SOLIDS, SPECTROSCOPY, STRUCTURES, TRANSPORT PROPERTIES, VIBRATIONAL SPECTRA, WATER VAPOR.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

AD-A188 502 11/6.1

RHODE ISLAND UNIV KINGSTON PASTORE CHEMICAL LAB

(U) Gordon Conference on Intermetallic Compounds Held at Tilton, New Hampshire on 20-24 July 1987.

DESCRIPTIVE NOTE: Final rept. Jul-Oct 87,

OCT 87 21P

PERSONAL AUTHORS: Pope, David P.; Lipsitt, Harry A.; Cruickshank, Alexander

CONTRACT NO. AFOSR-87-0195

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-1749

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1987 Gordon Research Conference on Physical Metallurgy was held 20-24 July 1987 at the Tilton School, Tilton, New Hampshire. The conference topic was Intermetallic Compounds . The primary purpose of the Conference was to bring together three rather disparate groups: scientists and engineers concerned with the mechanical properties of intermetallic compounds, theoreticians interested in the problems of alloy stability and the calculation and prediction of the effects of chemical composition on alloy stability, and engineers interested in developing and producing new alloys based on intermetallic compounds for elevated temperature service. Topics include: Overview Of Strength And Ductility Of Intermetallic Compounds, Dislocation Core Structure and Slip Systems in Intermetallic Compounds, Strengthening Mechanisms in Intermetallic Compounds, Creep and Fatigue of Intermetallic Compounds, Deformation of Non-Cubic Intermetallic Compounds, Overview of Brittle-Ductile Transition Mechanisms, Mechanisms of Ductility Improvement in Lithium, Grain Boundary Accommodation of Slip, Grain Boundary Modelling, Limitations and Approximations of Electronic Structure Calculations, The Thermodynamics of Extended Defects in Intermetallic Compounds, Quantum Mechanics and Fracture.

AD-A188 524 AD-A188 502

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DESCRIPTORS: (U) *INTERMETALLIC COMPOUNDS, ALLOYS, CHEMICAL COMPOSITION, CORES, CREEP, DEFECTS(MATERIALS), DEFORMATION, DISLOCATIONS, DUCTILE BRITTLE TRANSITION, DUCTILITY, FATIGUE, GRAIN BOUNDARIES, HIGH TEMPERATURE, LITHIUM, MECHANICAL PROPERTIES, PHYSICAL METALLURGY, QUANTUM THEORY, STABILITY, THERMODYNAMICS, MOLECULAR STRUCTURE, SYMPOSIA.

AD-A188 500 12/5

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) Primal - Dual Parallel Solution of Very Large Sparse Linear Programs.

DESCRIPTIVE NOTE: Final rept. 30 Jul 86-29 Jun 87,

SEP 87 6P

PERSONAL AUTHORS: Mangasarian, Olvi L.

CONTRACT NO. AFOSR-86-0255

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR TR-87-2037

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal area of our research has been the solution of very large sparse linear programs and linear complementarity problems by successive overrelaxation (SOR) methods. Another important ingredient of our research has been the parallelization of our SOR methods as well as other classical methods such as the simplex method for linear programming and Lemke's method for the linear complementarity problem. A major contribution of our research has been the solution of on of the largest general linear programs ever attempted on a workstation (or in fact on a mainframe). A linear program with 500,000 variables, 125,000 constraints and 1,125,000 nonzero matrix elements was solved in less than 72 hours on one of the Micro Vax II computers. Another significant achievement of our research has been the parallelization of our SOR methods with speedup efficiencies sometimes exceeding 100%. The MicroVax II's were used to test simulations of the parallel SOR algorithms before their implementation on our multicomputers and multiprocessors.

DESCRIPTORS: (U) *LINEAR PROGRAMMING, ALGORITHMS, MULTIPROCESSORS, PARALLEL PROCESSING, SIMPLEX METHOD, MICROCOMPUTERS, COMPUTERIZED SIMULATION.

IDENTIFIERS: (U) Multicomputers, PE61102F, WUAFOSR2917A5.

AD-A188 500

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 499 12/6

INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

(U) A Laboratory Facility for Research in Parallel Computation: Project Final Report.

DESCRIPTIVE NOTE: Final rept. 31 Jul 86-30 Jul 87,

JUL 87 42P

PERSONAL AUTHORS: Gannon, Dennis

CONTRACT NO. AFOSR-86-0279

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1981

UNCLASSIFIED REPORT

ABSTRACT: (U) This DOD URIP effort provided resources for the purchase of a BBN Butterfly parallel processor architecture for research into parallel processing. The equipment has been used to developed parallel algorithms for ray traced computer graphics, for numerical fast Fourier Transform (FFT) algorithms, and AI and expert system applications. Papers produced include such titles as Distributed Genetric Algorithms, and A software tool for building Supercomputer applications. Keywords: Multiprocessors; Programming; Compiler design; Interactive graphics; Optimization. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *PARALLEL PROCESSING, *COMPUTER ARCHITECTURE, COMPILERS, COMPUTATIONS, COMPUTER GRAPHICS, COMPUTER PROGRAMS, FAST FOURIER TRANSFORMS, INTERACTIVE GRAPHICS, NUMERICAL ANALYSIS, OPTIMIZATION, MULTIPROCESSORS, SUPERCOMPUTERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A188 498 12/6

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Support for Concurrent Computing Environments.

DESCRIPTIVE NOTE: Final rept. 15 Aug 86-15 Aug 87,

OCT 87 2P

PERSONAL AUTHORS: Klema, Virginia

CONTRACT NO. AFOSR-86-0227

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-87-2038

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant, under the URIP program, provided instrumentation equipment used to enhance research in concurrent computing. The equipment provided a network of concurrent computing machines. Keywords: Numerical algorithms; computations. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, *INSTRUMENTATION, ALGORITHMS, MACHINES, COMPUTER APPLICATIONS.

IDENTIFIERS: (U) *Concurrent computing, PE61102F, WUAFOSR2917A5.

AD-A188 496 12/4

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 86-30 Sep 87,

OCT 87 39P

PERSONAL AUTHORS: Willsky, Alan S.; Verghese, George C.

REPORT NO. LIDS-R-1689

CONTRACT NO. AFOSR-82-0258

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1683

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes accomplishments in the research program presently supported by Grant AFOSR-82-0258 over a period from July 1, 1982 to Sept. 30, 1987, with primary emphasis on the accomplishments from July 1, 1986 to Sept 30, 1987. The basic scope of this program is the analysis, estimation, and control of complex systems with particular emphasis on the development of asymptotic methods and theories for nearly singular systems the investigation of theoretical questions related to singular systems and the analysis of complex systems subject to our characterized by sequences of discrete events. These three topics are described in the three sections of this report. Keywords: Algorithms; Estimates; Detection.

DESCRIPTORS: (U) *LINEAR SYSTEMS, *SYSTEMS ANALYSIS, ALGORITHMS, ASYMPTOTIC SERIES, CONTROL SYSTEMS, DETECTION, METHODOLOGY, PERTURBATIONS, SEQUENCES, ESTIMATES.

IDENTIFIERS: (U) Singular systems, PE61102F, WUAFOSR2304A1.

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AD-A188 495 20/5 7/5

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Instrumentation for Collisional Energy Transfer Studies.

DESCRIPTIVE NOTE: Final rept. 15 Jul 86-14 Jul 87,

OCT 87 4P

PERSONAL AUTHORS: Crim, F. F.

CONTRACT NO. AFOSR-86-0244

PROJECT NO. 2319

TASK NO. A2

MONITOR: AFOSR TR-87-1706

UNCLASSIFIED REPORT

ABSTRACT: (U) Two dye laser systems were purchased for use in energy transfer studies and in unimolecular decomposition experiments. Individual angular momentum states of acetylene in the fourth vibrational state of the CH stretching mode were prepared. It was found that these molecules which contain 10,000 wave numbers of vibrational energy relax at several times the gas kinetic collision rate. There is a striking dependence on the initial rotational state excited implying relaxation of only relatively small amounts of rotational energy. Keywords: Molecular energy transfer, Vibrational energy transfer.

DESCRIPTORS: (U) *ACETYLENE, *LASER PUMPING, *MOLECULAR VIBRATION, *PHOTODECOMPOSITION, COLLISIONS, DECOMPOSITION, DYE LASERS, ENERGY, ENERGY TRANSFER, GASES, REACTION KINETICS, MOLECULAR ROTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2319A2.

AD-A188 495

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 49* 12/3

FLORIDA STATE UNIV TALLAHASSEE RELIABILITY CENTER

(U) Statistical Aspects of Reliability, Maintainability, and Availability.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 87,

OCT 87 11P

PERSONAL AUTHORS: Hollander, Myles; Proschan, Frank; Doss, Hani

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-2022

UNCLASSIFIED REPORT

ABSTRACT: (U) A total of 33 research reports were issued, and 35 papers were published in scientific journals or are in press. Research topics included optimal assembly of systems, multistate system theory, testing whether new is better than used nonparameter survival function estimation measuring information in censored models, generalizations of total positively and multivariate probability equalities. Keywords: Air Force research; Optimization; Stochastic processes; Bibliographics.

DESCRIPTORS: (U) *STATISTICAL TESTS, *BIBLIOGRAPHIES, AIR FORCE RESEARCH, ASSEMBLY, MAINTAINABILITY, MULTIVARIATE ANALYSIS, OPTIMIZATION, PERIODICALS, PROBABILITY, RELIABILITY, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A188 491

AD-A188 469 20/14 20/5

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Advanced Electron Optics for Vibrational Spectroscopy.

DESCRIPTIVE NOTE: Final rept. 15 Aug 86-14 Aug 87,

OCT 87 40P

PERSONAL AUTHORS: Erskine, J. L.

CONTRACT NO. AFOSR-86-0291

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-87-1704

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this project is to develop an inelastic electron scattering spectrometer with significantly enhanced capabilities for studying physical and chemical phenomena at surfaces. The instrument combines off-the-shelf commercial instrumentation for sample preparation and characterization with a prototype state-of-the-art high resolution electron energy loss spectrometer (EELS) for studying vibrational properties of surfaces. The capabilities of this new instrument are unique. It extends the application of high resolution electron energy loss spectroscopy to include studies of technical surfaces such as polycrystalline surfaces, disordered thin films and non-single crystal alloy surfaces. Important applications are anticipated including studies of technical surfaces as alloys of aluminum and titanium. The new instrument also extends the range of vibrational spectroscopy studies of single crystals. Detailed tests of scattering selection rules and accurate measurements of the energy and angular dependence of inelastic electron scattering are now possible using the new instrument.

DESCRIPTORS: (U) *ELECTRON OPTICS, *VIBRATIONAL SPECTRA, *ALUMINUM ALLOYS, *TITANIUM ALLOYS, *SURFACE CHEMISTRY, ANGLES, COMMERCE, ELECTRON SCATTERING, ENERGY, INELASTIC SCATTERING, MEASUREMENT, OFF THE SHELF EQUIPMENT, ORDER

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 469 CONTINUED

DISORDER TRANSFORMATIONS, PHYSICAL PROPERTIES, POLYCRYSTALLINE, SCATTERING, SELECTION, SINGLE CRYSTALS, SPECTROMETERS, SPECTROSCOPY, THIN FILMS, VIBRATION, SELECTION RULES(PHYSICS).

IDENTIFIERS: (U) EELS(Electron Energy Loss Spectroscopy), WUAFOSR2917A2, PE61102F.

AD-A188 468 7/1 20/5 4/1

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) Evaluation of Chemical and Atmospheric Sciences Research.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-14 Sep 87,

SEP 87

PERSONAL AUTHORS: Earley, Joseph E.

CONTRACT NO. F49620-84-C-0073

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1705

UNCLASSIFIED REPORT

ABSTRACT: (U) The noise level of onboard recorded helicopter data is significantly high due to the rotor vibration loads. This report evaluates the possibility to sample flight test data without using anti-aliasing filters. After the A/D-conversion the data are filtered using an algorithm in a digital computer. These data ste examined in comparison with anti-aliasing filtered data.

DESCRIPTORS: (U) *AERONOMY, *CHEMICAL ENGINEERING, *MOLECULAR BEAMS, *HYDROGEN, ATMOSPHERES, CHEMISTRY, COLORADO, MARYLAND, NEW MEXICO, OHIO, PANELS, SYMPOSIA, TEST AND EVALUATION, TEXAS, AIR FORCE RESEARCH, ELECTRIC ARCS, HIGH ENERGY, HIGH DENSITY, AERONOMY, ALGORITHMS, ATMOSPHERES, CHEMISTRY, DIGITAL COMPUTERS, EXPERIMENTAL DATA, FLIGHT TESTING, HELICOPTERS, LEVEL(QUANTITY), LOADS(FORCES), NOISE, ROTORS, VIBRATION.

IDENTIFIERS: (U) Trihydrogen, Tetrahydrogen, WUAFOSR2303A1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 467 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A High Level Ab Initio Study of Corner-Protonated Cyclopropane.

87 4P

PERSONAL AUTHORS: Dewar, Michael J.; Healy, Eamonn F.; Ruiz, James M.

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1714

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Society, Chemical Communication, p943-945 1987.

ABSTRACT: (U) The role of nonclassical carbocations has been of major interest to organic chemists for many years. The properties and structures of such ions remain uncertain because of an unfortunate but inevitable lack of experimental data. Very high level ab initio procedures have to be used in theoretical studies of such species if the results are to be meaningful and calculations using such procedures are currently restricted to relatively small molecules. The C3H7+ potential surface is therefore of especial importance because this is the simplest system where the existence of a nonclassical species (protonated cyclopropane) has been established by experiment. Two reasonably high level ab initio calculations have been reported for this system. Both predicted the existence of two nonclassical species, on the ethylene carbenium ion complex, (1)(corner-protonated cyclopropane), the other a species (2) with a three-centre two electron bond (edge-protonated cyclopropane). Both procedures predicted (1) to have C symmetry and (2) to have C2V symmetry, as indicated in the formulae, and both (1) and (2) were predicted to be intermediate in energy between the n-propyl (3) and isopropyl (4) cations. However while one calculation predicted (1) to be lower in energy than (2), the other

AD-A188 467 CONTINUED

led to the opposite conclusion. Keywords: Methyl radical, Chemical bonds, Cyclic compounds, Isomerism.

DESCRIPTORS: (U) *CHEMICAL BONDS, *COMPLEX IONS, *CYCLOPROPANES, CATIONS, CHEMISTS, COMPUTATIONS, ETHYLENE, EXPERIMENTAL DATA, IONS, MOLECULES, REPRINTS, SYMMETRY, THEORY.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

AD-A188 466 5/1

NATIONAL RESEARCH COUNCIL WASHINGTON DC

(U) Resident Research Associateship Program with the Air Force Systems Command.

DESCRIPTIVE NOTE: Final rept.,

87 11P

PERSONAL AUTHORS: Manka, Robert H.

CONTRACT NO. F49620-82-C-0027, F49620-85-C-0124

PROJECT NO. 2306

TASK NO. D8

MONITOR: AFOSR TR-87-1709

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant $AFOSR-85-01991R

ABSTRACT: (U) In addition to reporting on activities specifically sponsored under this contract, we also summarize any other current activities of the Air Force Associateship Program such as the termination of Associates who were sponsored under the previous year's contract. Furthermore, after each review of Air Force applicants, we have supplied a listing of all applicants who have passed the panel review. Keywords: Air Force research; Research management; Awards.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *FINANCIAL MANAGEMENT, *AWARDS, AIR FORCE, AIR FORCE SYSTEMS COMMAND, RESEARCH MANAGEMENT, CONTRACTS.

IDENTIFIERS: (U) WUAFOSR2306D8, PE61102F.

AD-A188 466

AD-A188 461 20/6 12/1 12/9

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING AND ELECTROPHYSICS*

(U) Optical Signal Processing Using Nonlinear Optics.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-31 Sep 87,

87 20P

PERSONAL AUTHORS: Steier, William H.

CONTRACT NO. AFOSR-84-0207

PROJECT NO. 2305

TASK NO. 84

MONITOR: AFOSR TR-87-1689

UNCLASSIFIED REPORT

ABSTRACT: (U) The 2-D correlation/convolution which can be achieved in real time via four wave mixing in nonlinear materials has been investigated in detail to determine the accuracy and signal power possible. This analysis was initiated under other support; the experimental confirmation was completed under this contract. The analysis which is based on Fourier transforms of the equations of nonlinear interactions has resulted in a closed from solution for the output and clearly shows how it differs from the desired 2-D correlation. In the example of a scene that is search for given objects, the accuracy decreases as the ratio of scene to object size increases. The accuracy also decreases as the length of the nonlinear material increases resulting in a trade-off between accuracy, size of the scanned scene, and power or signal to noise ratio in the output. The first result of this analysis is the realization that a non-colinear interaction is considerably less accurate than a colinear. In the typical four wave mixing scheme, the two inputs, B1 and B2, propagate at a small angle to each other within a nonlinear medium; the pump wave is counter to one of the inputs. This angle between the beams results in a lateral translation between the patterns as they propagate through the nonlinear material. The result is a correlation between smoothed versions of the inputs and a

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considerable error.

DESCRIPTORS: (U) *FOURIER TRANSFORMATION, *MIXING, *NONLINEAR SYSTEMS, *OPTICAL PROCESSING, *SIGNAL TO NOISE RATIO, ACCURACY, EQUATIONS, INTERACTIONS, MATERIALS, OPTICS, POWER, RATIOS, REAL TIME, SCANNING, SIGNAL PROCESSING, SIGNALS, SIZES(DIMENSIONS), WAVES.

IDENTIFIERS: (U) WUAFOSR230584, PE61102F.

AD-A188 460 7/6 22/2 22/5

SRI INTERNATIONAL MENLO PARK CA

(U) Ordered Polymers for Space Applications.

DESCRIPTIVE NOTE: Final rept., 1 May 85-30 Apr 87,

OCT 87 100P

PERSONAL AUTHORS: Wolfe, James F.; Bitler, Steven P.; Chow, Andrea W.

CONTRACT NO. F49620-85-K-0015

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1690

UNCLASSIFIED REPORT

ABSTRACT: (U) The synthesis of polybenzazole (PBZ) polymers and model compounds was studied to determine their (1) potential for use in nonlinear optical (NLO) applications and (2) reaction kinetics and chemo-rheology of polymerization in the ordered phase. Specific compounds that should exhibit high figures of merit NLO applications have been identified. The synthesis of PBZ polymers with controlled molecular weight is described, including a description of the synthesis variables important in attaining high intrinsic viscosity and low shear viscosity nematic solutions, leading to improved processability and reproducibility. THe phenomenon of mesophase-enhanced polymerization of poly(p-phenylenebenzobisthiazole) (PBT) and the chemo-rheological properties at various shear rates were investigated.

DESCRIPTORS: (U) *POLYMERS, *SPACE TECHNOLOGY, *BENZENE COMPOUNDS, *AZOLES, CONTROL, FIGURE OF MERIT, MOLECULAR WEIGHT, ORDER DISORDER TRANSFORMATIONS, RATES, REACTION KINETICS, REPRODUCIBILITY, SHEAR PROPERTIES, SYNTHESIS(CHEMISTRY), VARIABLES.

IDENTIFIERS: (U) LPN-SRI-PXU-8970, WUAFOSR2303A3, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 437 7/2

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Laser Probing of Gallium Atom Interactions with Silicon (100) Surfaces,

AUG 87

PERSONAL AUTHORS: Carleton, Karen L.; Leone, Stephen R.

CONTRACT NO. AFOSR-87-0119

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-87-1627

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Vaccuum Science and Technology, v5 n4 p1141-1146 Jul-Aug 87.

ABSTRACT: (U) The interactions of gallium atoms with silicon (100) surfaces are studied with laser probing. Molecular-beam epitaxy (MBE) is a promising technique for growing high quality, low defect devices, especially those containing complex microstructures. This technique has been particularly useful for growing III-V materials such as gallium arsenide. In the past several years, there has been considerable interest in growing gallium arsenide devices on silicon substrates. However, very little is known about the fundamental interactions of gallium or arsenic beams with silicon surfaces. The present work was undertaken to understand the Ga-Si system better.

DESCRIPTORS: (U) *GALLIUM, *SILICON, *SURFACES, ATOMS, DEFECTS(MATERIALS), EPITAXIAL GROWTH, GALLIUM ARSENIDES, GROUP III COMPOUNDS, GROUP V COMPOUNDS, INTERACTIONS, LASERS, MATERIALS, MOLECULAR BEAMS, SUBSTRATES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

AD-A188 436 20/5

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Observation of Three-Body Collisional Transfer between Atomic Levels,

AUG 87 4P

PERSONAL AUTHORS: Harris, M.; Kelly, J. F.; Gallagher, A.

CONTRACT NO. AFOSR-84-0272

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1639

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v36 n3 p1512-1514, 1 Aug 87.

ABSTRACT: (U) Collisional J-mixing rates between the J = 0,1,2 states of the Sr(5 3P sub J) multiplet have been measured in the presence of rare-gas perturbers. For Kr and Xe pressures above 100 Torr, the rates are dominated by a component which is quadratic in pressure. This very unusual behavior is brought about by the simultaneous interaction of a Sr atom with two perturbers and not by excimer formation. Keywords: Energy transfer; Strontium; Reprints.

DESCRIPTORS: (U) *STRONTIUM, *ATOMIC ENERGY LEVELS, ATOMS, ENERGY TRANSFER, INTERACTIONS, REPRINTS, SYNCHRONISM, PARTICLE COLLISIONS, SPECTRUM ANALYSIS, KRYPTON, XENON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 397 4/1 20/6

UTAH STATE UNIV LOGAN

(U) Mesospheric Minor Species Determinations from Rocket and Ground-Based i.r. Measurements,

87

PERSONAL AUTHORS: Ulwick, J. C.; Baker, K. D.; Baker, D. J.; Steed, A. J.; Pendleton, W. R., Jr

CONTRACT NO. AFOSR-85-0163

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-87-1664

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Atmospheric and Terrestrial Physics, v49 nos7/8 p855-862 1987.

ABSTRACT: (U) A wealth of ground-based, balloon and rocket measurements of the airglow hydroxyl (OH) emission has been accumulated by various experiments. Indeed, since the first reported rocket observations (HEPPNER and MEREDITH, 1958), there have been over 50 rocket flights from which OH emission profiles have been reported (BAKER and STAIR, 1987). The sensors initially measured in the visible range (PACKER, 1961) and later in the infrared (LOWE, 1960; BAKER, 1978). Models have been constructed of the photochemistry (MOREELS et al., 1977; BATTANER and LOPEZ-MORENO, 1979) and of the vertical species transport in an attempt to fit the measured hydroxyl radiance variations. However, uncertainties exit in quenching rate coefficients, radiation transition probabilities and number densities of participating species, such that results are not conclusive (COXON and FOSTER, 1982; DUPUIS et al., 1986). As part of the overall investigation of neutral atmospheric dynamics of the middle atmosphere and to investigate the excitation processes of the night airglow, a coordinated rocket and ground-based measurement program was conducted as part of the MAP/WINE campaign to observe simultaneously several key parameters.

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DESCRIPTORS: (U) *AIRGLOW, *MESOSPHERE, *ATMOSPHERIC CHEMISTRY, BALLOONS, DETECTORS, EMISSION, EXCITATION, GROUND LEVEL, MEASUREMENT, NIGHT, PHOTOCHEMICAL REACTIONS, PROBABILITY, PROFILES, RADIATION, SOUNDING ROCKETS, TRANSITIONS, TRANSPORT, VERTICAL ORIENTATION, VISIBILITY, ATMOSPHERIC SOUNDING, HYDROXYL RADICALS, INFRARED RADIATION, TRANSPORT PROPERTIES, INFRARED DETECTION, REPRINTS.

IDENTIFIERS: (U) Hydroxyl, PE61102F, WUAFOSR2310A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 368 15/6.3 5/8

COLORADO UNIV AT BOULDER

(U) Effects of Chronic Diisopropylfluorophosphate Treatment on Spatial Learning in Mice,

87 10P

PERSONAL AUTHORS: Upchurch, Margaret; Wehner, Jeanne M.

CONTRACT NO. AFOSR-85-0369, $PHS-HD-07289-01

MONITOR: AFOSR
TR-87-1673

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Pharmacology Biochemistry and Behavior, v27 p143-151 1987.

ABSTRACT: (U) The Morris water task was used to measure the effects of chronic diisopropylfluorophosphate (DFP) treatment on C57BL/6Ibg mice. Control mice showed good task acquisition and searched accurately for the platform after it was removed from the pool, suggesting that they had formed a spatial map of the platform's location relative to distal cues. In contrast, mice chronically treated with DFP prior to training showed a marked deficit in spatial learning. Chronic DFP treatment did not affect ability to locate a visible platform and did not impair task retention in mice trained to find the hidden platform prior to DFP treatment. The chronic DFP treatment decreased muscarinic binding in cortex, hippocampus, and striatum. These results indicate that C57BL mice are capable of spatial learning in the water task. The ability of chronic DFP treatment to impair place but not cue learning suggests that the cholinergic dysfunction produced by DFP is similar to those produced by lesions of central cholinergic systems and acute treatments with muscarinic antagonists. Keywords: Organophosphates; Acetylcholine; Adaptive learning; Reprints.

DESCRIPTORS: (U) *ADAPTIVE TRAINING, *ORGANOPHOSPHATES, *TOXICITY, *CONDITIONING(LEARNING), ACETYLCHOLINE, CHOLINERGIC NERVES, DYSFUNCTION, HIPPOCAMPUS, LESIONS, MICE, MUSCARINE, PHARMACOLOGICAL ANTAGONISTS, PLATFORMS, REPRINTS, VISIBLE SPECTRA, WATER, ORIENTATION(DIRECTION), RETENTION(PSYCHOLOGY), LEARNING CURVES.

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IDENTIFIERS: (U) *DFP(Diisopropylfluorophosphate), *Spatial learning, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 367 5/8 6/4

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) Dorsolateral Pontine Tegmentum and the Classically Conditioned Nictitating Membrane Response: Analysis of CR-Related Single-Unit Activity,

86 17P

PERSONAL AUTHORS: Desmond, J. E.; Moore, J. W.

CONTRACT NO. AFOSR-86-0182, $AFOSR-83-0215

MONITOR: AFOSR
TR-87-1672

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Experimental Brain Research, v65 p59-74 1986.

ABSTRACT: (U) The classically conditioned nictitating membrane (NM) response in rabbit has been widely adopted for studying learning at both behavioral and physiological levels (Farley and Alkon 1985; Gormezano et al. 1983; Moore 1979; Thompson et al. 1976). Recent evidence indicates that the cerebellum and related structures are critically involved in the control of this behavior (e.g., McCormick et al. 1981; Yeo et al. 1985a). However, a second system, involving reticular formation in the dorsolateral pontine brain stem (DLP), including the supratrigeminal region (SR) (Desmond and Moore 1983), may also participate in the control of CRs (e.g., Desmond and Moore 1982). To date, there is no evidence of direct connections between the DLP/SR and components of the cerebellar circuit, and DLP/SR might therefore be a circuit that is separate from the cerebellar circuit but is nonetheless also essential for the NM CR. Previous investigations have suggested that the dorsolateral pontine tegmentum (DLP) may be part of a system essential for classical conditioning of the nictitating membrane response. The present study examined CR-related firing patterns of extracellularly-recorded single units in the DLP. Differential conditioning, using tonal CSs and periocular electrostimulation as the US, was employed so that firing patterns on CR and non-CR trials could be compared. In light of evidence indicating that the cerebellum is critically involved in conditioning-cerebellum and the DLP, may be in control of CRs. The

AD-A188 367 CONTINUED

relationship of the two systems and their possible roles in conditioning are discussed. Keywords: Reprints.

DESCRIPTORS: (U) *CONDITIONED RESPONSE, *MEMBRANES(BIOLOGY), BEHAVIOR, CEREBELLUM, LEARNING, PATTERNS, PHYSIOLOGY, RABBITS, REPRINTS, CONDITIONING(LEARNING), RESPONSE(BIOLOGY), STIMULI, STIMULATION(PHYSIOLOGY), EYE MOVEMENTS.

IDENTIFIERS: (U) *Nictitating membranes, *Pontine tegmentum, Conditioned stimuli, Unconditioned stimuli, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 360 7/2

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) High-Temperature Photoelectron Spectroscopy. A Study of Niobium Monoxide and Tantalum Monoxide,

87 12P

PERSONAL AUTHORS: Dyke, John M.; Ellis, Andrew M.; Feher, Miklos; Morris, Alan; Paul, Alan J.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1677

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Society, Faraday Trans. 2, v83 n8 p1555-1565 1987.

ABSTRACT: (U) The He I photoelectron spectra of Nbo and TaO have been recorded. In both cases four main bands were observed which can be attributed to ionization of the isolated metal monoxide molecule. Bands associated with other oxides or the metal were not observed. Assignment of the photoelectron spectra of NbO and TaO was made with the aide of Hartree-Fock-Slater (HFS) calculations and by comparison with the known photoelectron spectrum of VO. The first adiabatic ionization energies of NbO and TaO have been measured as 7.91 + or - 0.02 eV and 8.6 + or - 0.02 eV, respectively. Suggestions are made to explain the poor agreement between previous mass-spectrometric values for the first ionization energy of each oxide. Keywords: Niobium oxide; Tantalum oxide; Reprints; Vanadium oxide.

DESCRIPTORS: (U) *MONOXIDES, *NIOBIUM COMPOUNDS, *PHOTOELECTRON SPECTRA, *TANTALUM, ADIABATIC CONDITIONS, BANDS(STRIPS), ENERGY, HIGH TEMPERATURE, IONIZATION, ISOLATION, MASS SPECTROMETRY, METAL COMPOUNDS, MOLECULES, NIOBIUM, PHOTOELECTRONS, REPRINTS, SPECTRA, VANADIUM COMPOUNDS.

IDENTIFIERS: (U) PE61102F.

AD-A188 360

AD-A188 339 20/4

HOKENSON CO LOS ANGELES CA

(U) Coherent Structure-Reflective Turbulent Viscous Flow Modeling.

DESCRIPTIVE NOTE: Final rept. Mar 85-Mar 87,

SEP 87 94P

PERSONAL AUTHORS: Hokenson, Gustave J.

REPORT NO. HOKE-87-AF-01

CONTRACT NO. F49620-85-C-0075

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1660

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Three aspects of turbulent structure in shear flows were investigated theoretically. Both analytical and computational strategies were employed to extract new information on: 1) advection velocities of large-scale structure; 2) the velocity vector angle characteristics of turbulent fluctuations; and 3) the 'stability' characteristics of the mean turbulent velocity profile. With regard to topic1, the study of the propagation of a bulge in wall-bounded shear flow has exposed three characteristic propagation speeds. In (temporally and/or spatially) variable pressure flows, a unique inverse approach to the problem has exposed the critical value for the shape factor (H) of 2.0. This result impacts not only turbulent structure dynamics but flowfield separation as well. The work on topic 2, has served to clarify the importance of angular structure with respect to the interpretations of turbulence physics, the modeling thereof and advantages of those variables in numerical simulation. Finally, the mean turbulent velocity profile was found to support unstable modes of oscillation for the large-scale structure if the

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unresolved small scale processes are modeled appropriately. Keywords: Turbulent Viscous flow.

DESCRIPTORS: (U) *FLOW SEPARATION, *TURBULENT FLOW, *VISCOUS FLOW, ADVECTION, ANGLES, COMPUTATIONS, DYNAMICS, UNSTEADY FLOW, FLOW FIELDS, INVERSION, MEAN, NUMERICAL ANALYSIS, OSCILLATION, PROFILES, PROPAGATION, SHAPE, STRATEGY, STRUCTURAL PROPERTIES, TURBULENCE, VARIABLE PRESSURE, VARIATIONS, VECTOR ANALYSIS, VELOCITY, COHERENCE, MATHEMATICAL MODELS, TURBULENT BOUNDARY LAYER, FREE STREAM.

IDENTIFIERS: (U) Shear flow, Coherent structures(Fluid dynamics), PE61102F, WUAFOSR2307A2.

AD-A188 333 20/5

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) Gas Phase High Temperature Photoelectron Spectroscopy: An Investigation of the Transition Metals Scandium and Vanadium,

85 12P

PERSONAL AUTHORS: Dyke, J. M.; Gravenor, B. W.; Hastings, M. P.; Josland, G. D.; Morris, A.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1676

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electron Spectroscopy and Related Phenomena, v35 p65-75 1985.

ABSTRACT: (U) The He(I) photoelectron spectra of atomic scandium and vanadium have been recorded in the gas-phase. For scandium two bands associated with a 1/4s ionization and one band associated with a 1/3d ionization of the neutral atom have been observed. Measurement of their relative intensities allows the sigma 3d: sigma 4s photoionization cross-section ratio in atomic scandium to be estimated as 57.1 + or - 9.0. In the atomic vanadium spectrum, six bands were seen. Four of these correspond to 1/3d and 1/4s ionizations of the ground state of the neutral atom, the V a 4F state, whereas two bands correspond to 1/3d ionizations of an excited state, the Va6D state, which is approximately 2100/cm above the ground state. Measurement of the intensities of bands arising from the Va4F state allows sigma 3d: sigma 4s to be estimated as 29.8 + or - 2.5 for vanadium. Spectra of vanadium have been recorded with both single- and multi-detector photoelectron spectrometers. Comparison of the data acquisition rates obtained with both spectrometers demonstrates the advantage of using a multidetector instrument in high temperature photoelectron spectroscopy.

DESCRIPTORS: (U) *PHOTOELECTRON SPECTRA, *SCANDIUM,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 333 CONTINUED

*VANADIUM, *EMISSION SPECTROSCOPY, ATOMS, DATA ACQUISITION, DATA RATE, GROUND STATE, HIGH TEMPERATURE, INTENSITY, NEUTRAL, SPECTRA, SPECTROMETERS, BAND SPECTRA, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A188 332 12/3 15/5

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF APPLIED MATHEMATICS AND STATISTI CS

(U) An Inventory with Constant Demand and Poisson Restocking,

87 9P

PERSONAL AUTHORS: Baxter, Laurence A.; Lee, Eui Y.

CONTRACT NO. AFOSR-86-0136

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1674

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability in the Engineering and Informational Sciences, v1 p203-210 1987.

ABSTRACT: (U) An inventory whose stock decreases linearly with time is considered. The inventory may be replenished at the instants at which a deliveryman arrives provided that the level of the inventory does not exceed a certain threshold; deliveries are made according to a Poisson process. A partial differential equation for the distribution function of the level of the inventory is solved to yield a formula for the corresponding Laplace-Stieltjes transform. The evaluation of the transform is discussed and explicit results are obtained for the stationary case.

DESCRIPTORS: (U) *INVENTORY ANALYSIS, *STATISTICAL ANALYSIS, DISTRIBUTION FUNCTIONS, INVENTORY, PARTIAL DIFFERENTIAL EQUATIONS, POISSON EQUATION, REPRINTS, STATIONARY, REPLENISHMENT, DELIVERY.

IDENTIFIERS: (U) Laplace Stieltjes transform, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 325 17/9 20/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES OPTICAL MATERIALS AND DEVICES L AB

(U) Integrated Optical Synthetic Aperture Radar Processor.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-30 Nov 85,

SEP 87 55P

PERSONAL AUTHORS: Tanguay, Armand R., Jr

REPORT NO. USC/OMDL-1601

CONTRACT NO. AFOSR-84-0352

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-87-1594

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this research program was initiation of the development of a compact, rugged, low-cost, low-power optical synthetic aperture radar processor for real-time image formation aboard airborne and spaceborne platforms. The extremely high computational burden associated with SAR imaging has thus for limited the usefulness of the technique to non-real-time applications from fixed platform bases. Existing real-time digital and optical techniques are in general too bulky, power consumptive, and expensive for broad applicability, particularly in space-confined mobile environments. The integrated optics approach described herein provides a powerful solution with which to circumvent these limitations. The key to this novel optical processing concept is the use of planar optical wave guide technology (which allows the integration of optical components in a single substrate) in conjunction with a time-and-space integrating architecture (which allows two dimensional processing to be performed in a quasi-planar optical structure). An additional novel feature is the utilization of partial waveguide confinement to allow uniform light emission vertically out of the plane of the integrated optical substrate and onto a two-dimensional time-integrating detector.

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DESCRIPTORS: (U) *FLYING PLATFORMS, *IMAGES, *INTEGRATED SYSTEMS, *OPTICAL EQUIPMENT, *OPTICAL PROCESSING, *SPACEBORNE, CONFINEMENT(GENERAL), INTEGRATION, OPTICAL PROPERTIES, OPTICS, PROCESSING, REAL TIME, SUBSTRATES, TWO DIMENSIONAL, WAVEGUIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A188 325

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 323 5/8 6/4

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Neurocognitive Predictions of Performance.

DESCRIPTIVE NOTE: Final rept. 24 Mar 84-23 Aug 87,

SEP 87 67P

PERSONAL AUTHORS: Gevins, Alan S.

CONTRACT NO. F49620-84-K-0008

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-87-1593

UNCLASSIFIED REPORT

ABSTRACT: (U) Our aim is to measure the functional neural networks responsible for human goal-directed behaviors. During the past three years we developed new methods for recording and analyzing the electrical activity of the brain while subjects perform simple cognitive tasks. We have sought to determine the feasibility of predicting decrements in performance associated with transient attentional lapses or operational fatigue. Using the method of Event-Related Covariance (ERC) analysis, we found distributed neural preparatory sets that predicted the accuracy of subsequent responses. In a second experiment on the effects of operational fatigue in U.S. Air Force test pilots, we found fatigue-related neuroelectric changes during cognitive processing that preceded appreciable degradations in performance. These results suggest the feasibility of on-line systems that warn of impaired performance due to prolonged mental work by persons engaged in critical or hazardous work.

DESCRIPTORS: (U) *COGNITION, *PSYCHOPHYSIOLOGY, BRAIN, ELECTRICAL PROPERTIES, FATIGUE(PHYSIOLOGY), FEASIBILITY STUDIES, HAZARDS, MENTAL ABILITY, NEURAL NETS, ON LINE SYSTEMS, PROCESSING, NEUROLOGY, PERFORMANCE(HUMAN), PATTERN RECOGNITION, PARALLEL PROCESSING, SPATIAL DISTRIBUTION, BEHAVIOR, ELECTROENCEPHALOGRAPHY, PREDICTIONS.

AD-A188 323

AD-A188 323 CONTINUED

IDENTIFIERS: (U) ERP(Event Related Potentials), Evoked potentials, P300, ERC(Event Related Covariance), PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 307 12/4 25/5

CLEMSON UNIV SC DEPT OF MATHEMATICAL SCIENCES

(U) Algebraic Methods Applied to Network Reliability Problems. Revision.

DESCRIPTIVE NOTE: Technical rept.,

SEP 86 21P

PERSONAL AUTHORS: Shier, Douglas R.; Whited, David E.

REPORT NO. TR-486-REV

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1589

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Aug 85.

ABSTRACT: (U) An algebraic structure underlying communications network reliability problems is presented for determining the 2-terminal reliability of directed networks. An iterative algorithm is derived from this algebraic perspective to solve the (s,j)-terminal reliability problem simultaneously for all nodes j. In addition to providing an exact answer (in the form of a reliability polynomial), the algorithm also yields a nondecreasing sequence of approximate solutions guaranteed to be lower bounds on the exact solution. Empirical results, presented for two different implementations of the algorithm, show that useful approximate solutions can be obtained in a reasonable amount of computation time. Keywords: Fortran; Computations.

DESCRIPTORS: (U) *ALGEBRA, *ALGORITHMS, *NETWORK ANALYSIS(MANAGEMENT), COMMUNICATIONS NETWORKS, COMPUTATIONS, FORTRAN, ITERATIONS, POLYNOMIALS, RELIABILITY, SOLUTIONS(GENERAL), TIME, PROBLEM SOLVING, GRAPHS, LABELS.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 283 9/1 20/12 13/8 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Study of Quantum Mechanical Effects in Deep Submicron, Grating-Gate Field Effect Transistors.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 86-29 Sep 87,

OCT 87 8P

PERSONAL AUTHORS: Antoniadis, Dimitri A.; Smith, Henry I.

CONTRACT NO. AFOSR-85-0376

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-87-1659

UNCLASSIFIED REPORT

ABSTRACT: (U) This research program investigates the effect of extreme submicron spatial modulation of the electrostatic potential on the transport in a two-dimensional electron gas (2DEG) in silicon and in III-V compound semiconductor devices. The test vehicle is the so-called grating-gate FET (GGFET). When made to move in a direction perpendicular to the grating gate, electrons experience a surface superlattice (SSL) effect. When moving along the potential modulation electrons are restricted to only one degree of freedom, and thus constitute a quasi-one-dimensional (Q1D) system. Our major achievements in the past year include: In silicon we have fabricated, with high yield, grating gate transistors and measured their current voltage characteristics at liquid helium temperatures. The device mobility at 4 K is about 15000 sq cm/Vs, possibly the highest reported for MOSFETs fabricated using e-beam or x-ray lithographies. Keywords: Surface superlattice, X ray lithography, Deep UV lithography.

DESCRIPTORS: (U) *CRYSTAL LATTICES, *GATES(CIRCUITS), *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *LITHOGRAPHY, *MOSFET SEMICONDUCTORS, *SILICON, *TRANSISTORS, ELECTRON GAS, ELECTRONS, ELECTROSTATICS, GRATINGS(SPECTRA), HIGH RATE, LIQUID HELIUM, MODULATION, QUANTUM THEORY, SEMICONDUCTOR DEVICES, SPATIAL DISTRIBUTION, SURFACES.

AD-A188 283

AD-A188 283 CONTINUED

TEMPERATURE, TEST VEHICLES, TWO DIMENSIONAL, ULTRAVIOLET RADIATION, VOLTAGE, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A188 283

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 282 11/6.1 11/4

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

(U) Micro-Mechanisms of Deformation in SiC/Al Composites.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-31 Aug 87,

AUG 87 37P

PERSONAL AUTHORS: Papazian, John M.; Levy, Alvin; Adler, Philip N.

REPORT NO. RE-738

CONTRACT NO. F49620-84-C-0055

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-1658

UNCLASSIFIED REPORT

ABSTRACT: (U) The deformation mechanisms of aluminum matrix composites containing SiC whiskers or particulate were investigated both experimentally and analytically to determine factors critical to their mechanical behavior. The effects of the discontinuous SiC on age-hardening behavior; the influence of silicon carbide morphology; interactions between SiC dispersoids and matrix precipitates, and dislocations were considered. Two matrix alloys were investigated: a solution-hardened 5456 alloy containing no matrix precipitates; and a 2124 alloy that could be aged and cold worked to contain different matrix precipitate microstructures and dislocation contents. The influence of SiC on the age-hardening behavior of 2124 was evaluated using differential scanning calorimetry. The precipitation sequence in the composites was found to be very similar to that in SiC-free material prepared by either powder or ingot metallurgy. Both whiskers and particulate increased the quench sensitivity of 2124 by causing the precipitation of GPB zones and S' during the quench from solution heat treatment. This effect was independent of quench rate.

DESCRIPTORS: (U) *ALUMINUM, *COMPOSITE MATERIALS, *SILICON CARBIDES, AGE HARDENING, CALORIMETRY, CASTINGS,

AD-A188 282

AD-A188 282 CONTINUED

DEFORMATION, DISLOCATIONS, DISPERSIONS, MATRIX MATERIALS, MORPHOLOGY, SCANNING, SOLUTION HEAT TREATMENT, WHISKER COMPOSITES, METAL MATRIX COMPOSITES, ALUMINUM ALLOYS, MICROSTRUCTURE, MODULUS OF ELASTICITY, COLD WORKING, FINITE ELEMENT ANALYSIS, STIFFNESS, REINFORCED PLASTICS, DISPERSION HARDENING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 281 9/3 20/4

UNIVERSITY OF SOUTH FLORIDA TAMPA DEPT OF PHYSICS

(U) Self-Pumped Phase Conjugation in a Supersonically Flowing Medium.

DESCRIPTIVE NOTE: Final rept. 15 Jul 84-14 Jul 87,

SEP 87 11P

PERSONAL AUTHORS: Djeu, N.

CONTRACT NO. AFOSR-84-0226

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-87-1656

UNCLASSIFIED REPORT

ABSTRACT: (U) This program investigated the feasibility of producing degenerate two wave mixing gain in a noninverted resonant medium with local response. According to theory, two wave mixing gain should be possible if the resulting index grating is shifted in space with respect to the intensity grating produced by the two crossed beams. A pulsed molecular beam valve operated at 100 C was used to produce the supersonically cooled I2 jet. To achieve the moving grating effect, the pump and probe beams were to be crossed in a plane containing the flow axis, with each beam nearly perpendicular to that axis. The pulsed beam valve produced a broad forward peaked distribution of molecules. The velocity distribution at any given point, however, was mainly along the direction of the line joining that point to the nozzle orifice. This was the evidenced by the fluorescence pattern along the laser beam path, which consisted of sharp filaments across the laser beam corresponding to various hyperfine components of a single rotational transition Doppler tuned into resonance with the laser beam at various angles of inclination. Gain in the planned experiment would be observable only within a narrow range of detuning (obtained by crossing the pump and probe beams), and therefore only a small solid angle of the I2 jet is useful. Various nozzles were tried with the pulsed valve device. Under the best circumstances, an

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integrated absorption of only about 10% was measured. With the required angular selection, the expected gain would be on the order of .01%. Since the stability of the laser was such that even after signal averaging a noise of the order of 0.1% remained, it precluded our attempt to demonstrate gain, self pumped, supersonic flow. Keywords: Iodine.

DESCRIPTORS: (U) *CROSS BEAM DEVICES, *LASER BEAMS, *SUPERSONIC FLOW, ABSORPTION, ANGLES, DETUNING, DISTRIBUTION, FILAMENTS, JET FLOW, FLUORESCENCE, GAIN, GRATINGS(SPECTRA), INDEXES, INTEGRATED SYSTEMS, INTENSITY, IODINE, JOINING, DYE LASERS, MEAN, MIXING, MOLECULAR BEAMS, MOLECULES, MOTION, NOZZLES, ORIFICES, PATHS, PATTERNS, PULSES, PUMPING, RESONANCE, RESPONSE, SELECTION, SHARPNESS, SIGNALS, SLOPE, SOLIDS, STABILITY, VALVES, VELOCITY, WAVES, HYPERFINE STRUCTURE, GAS FLOW, PROBES.

IDENTIFIERS: (U) Two wave mixing absorption, Self pumped, Conjugation, PE61102F, WUAFOSR2301A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 280 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) A Generalized Quantile Estimator under Censoring.

DESCRIPTIVE NOTE: Technical rept.,

FEB 87

PERSONAL AUTHORS: Lio, Y. L.; Padgett, W. J.

REPORT NO. TR-124

CONTRACT NO. AFOSR-84-0156, $MIPR-ARO-139-85

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1617

UNCLASSIFIED REPORT

ABSTRACT: (U) Based on right-censored data from a lifetime distribution F sub 0, a smooth alternative to the product-limit estimator as a nonparametric quantile estimator of a population quantile is proposed. The estimator is a generalized product-limit quantile obtained by averaging appropriate subsample product-limit quantiles over all subsamples of a fixed size. Under the random censorship model and some conditions of F sub 0, it is shown that the estimator is consistent and has the same asymptotic normal distribution as the product-limit quantile estimator performs better than the product-limit quantile estimator in the sense of estimated mean squared errors.

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, ASYMPTOTIC SERIES, CENSORSHIP, MATHEMATICAL MODELS, NORMAL DISTRIBUTION, RANDOM VARIABLES, SIZES(DIMENSIONS), MONTE CARLO METHOD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A188 280

AD-A188 279 20/6 12/6

CITY COLL NEW YORK INST FOR ULTRAFAST SPECTROSCOPY AND LASERS

(U) Subpicosecond Optical Digital Computation Using Phase Conjugate Parametric Generators.

DESCRIPTIVE NOTE: Final rept. (Annual) Dec 86-Aug 87,

OCT 87 9P

PERSONAL AUTHORS: Alfano, Robert R.; Eichmann, George; Dorsinville, Roger; Li, Yao

REPORT NO. RF-447211

CONTRACT NO. AFOSR-84-0144

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-87-1616

UNCLASSIFIED REPORT

ABSTRACT: (U) Fundamental optical nonlinear processes based on x(2) and x(3) in different materials (liquids, polymers, and semiconductors) were investigated for size and speed. Ultrafast optical logic devices, switches, and processes based on these nonlinear optical materials were designed, built, and tested. Twenty one papers were published during this work in the period 1986-1987. Keywords include: Ultrafast technology, Optical computation, Phase conjugation, and Nonlinear optics.

DESCRIPTORS: (U) *DIGITAL SYSTEMS, *LOGIC DEVICES, *NONLINEAR SYSTEMS, *OPTICAL EQUIPMENT, *OPTICAL MATERIALS, *OPTICAL PROCESSING, COMPUTATIONS, GENERATORS, HIGH RATE, OPTICS, PARAMETRIC ANALYSIS, POLYMERS, SEMICONDUCTORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 278 12/1 11/7

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Stable, Robust Tracking by Sliding Mode Control,

MAY 87 13P

PERSONAL AUTHORS: Verghese, George C.; Fernandez, Benito; Hedrick, J. K.

REPORT NO. LIDS-P-1666

CONTRACT NO. DAAG29-84-K-0005, $AFOSR-82-0258

MONITOR: AFOSR TR-87-1611

UNCLASSIFIED REPORT

ABSTRACT: (U) Sliding mode control is examined from the perspective of obtaining stable and robust tracking of an arbitrary time-varying reference by a multi-input-output, linear, time-invariant system driven by a certain class of bounded errors, nonlinearities and disturbances. Most exciting schemes for such systems are subsumed by the one presented here. The results are developed via the use of inverse models, and make clear the constraints imposed by the finite and infinite zero structure of the system. In particular, stable and robust tracking is shown to be obtained by the scheme in this paper if and only if the system is minimum phase. Keywords include: Sliding modes, Variable structure systems, Tracking, Robust control, Inverse models, and Zeros.

DESCRIPTORS: (U) *CONTROL, *SLIDING, *TRACKING, *VARIABLES, ERRORS, INVARIANCE, INVERSION, MODELS, TIME, VARIATIONS.

AD-A188 277 12/4

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Failure Detection and Identification in Linear Time-Invariant Systems,

JUL 86 47P

PERSONAL AUTHORS: Massoumnia, Mohammad-Ali; Verghese, George C.; Willsky, Alan S.

REPORT NO. LIDS-P-1578

CONTRACT NO. AFOSR-82-0258

MONITOR: AFOSR TR-87-1607

UNCLASSIFIED REPORT

ABSTRACT: (U) A solution to the problem of detecting and identifying control system component failures in linear time-invariant systems is given using the geometric concept of an unobservability subspace. Conditions are developed under which it is possible to design a causal linear processor that can be used to detect and uniquely identify a component failure in a linear time-invariant system, assuming either i) the components can fail simultaneously, or ii) the components can fail only one at a time. Explicit design algorithms are provided when those conditions are satisfied. In addition to the time domain solvability conditions, the frequency domain interpretation of the results are given, and connection is drawn with the results already available in the literature.

DESCRIPTORS: (U) *CONTROL THEORY, CONTROL SYSTEMS, FAILURE, RELIABILITY, FAULT TOLERANT COMPUTING, IDENTIFICATION, MATRICES(MATHEMATICS), TRANSFER FUNCTIONS.

IDENTIFIERS: (U) Frequency domain, FTCS(Fault Tolerant Control Systems).

AD-A188 260 12/2

LOYOLA UNIV OF CHICAGO IL DEPT OF MATHEMATICAL SCIENCES

(U) Generalized Viscosity Solutions for Hamilton-Jacobi Equations with Time-Measurable Hamiltonians.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 13P

PERSONAL AUTHORS: Barron, Emmanuel N.; Jensen, Robert

CONTRACT NO. AFOSR-86-0202

MONITOR: AFOSR TR-87-1484

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Differential Equations, v68 n1 p10-21, 15 Jun 87.

ABSTRACT: (U) The objective of this paper is to extend the idea of viscosity solution for nonlinear first order Hamilton-Jacobi equations, u(t) + H(t,x, D(x)u) = 0 with time-continuous H to time-measurable hamiltonians. We are primarily motivated by the fact that control problems, for which the value function is the viscosity solution of a Hamilton-Jacobi equation, should not be restricted to continuity in time. In Barron and Jensen we were confronted with a linear Hamilton-Jacobi equation arising in the proof of the Pontryagin which had time-measurable coefficients. The existing theory of viscosity solutions did not apply to even this case. Moreover, important models of controlled first order Hamilton-Jacobi equations require time-measurable controls. For example, models of controlled traffic flow or queueing processes might be of this type. We are about then to extend the definition of viscosity solution to generalized viscosity solution applying to time-measurable hamiltonians. In this paper we give the definition and derive the corresponding uniqueness result with an implicit domain of dependence consequent. The fundamental technique used in the proof is the so-called blow up method which has also been used elsewhere, although not in the generality discussed here.

DESCRIPTORS: (U) *SOLUTIONS(GENERAL), *THEORY, *VISCOSITY, *MATHEMATICAL ANALYSIS, CONTINUITY, CONTROL,

AD-A188 260

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FLOW, LIMITATIONS, QUEUEING THEORY, TRAFFIC, REPRINTS.

AD-A188 259 12/3

SOUTHERN ILLINOIS UNIV AT EDWARDSVILLE

(U) Prediction Intervals for the Gamma Distribution.

DESCRIPTIVE NOTE: Technical rept.,

86 7P

PERSONAL AUTHORS: Shiue, Wei-Kei; Bain, Lee J.

CONTRACT NO. AFOSR-84-0164

MONITOR: AFOSR
TR-87-1610

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Computer Science and Statistics, p405-410 1986.

ABSTRACT: (U) Approximate prediction intervals for a single future observation for the average for m future observations are developed for the two-parameter gamma distribution were both parameters are considered unknown. The methods are illustrated with three examples.

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, INTERVALS, PARAMETERS, PREDICTIONS, REPRINTS, MAXIMUM LIKELIHOOD ESTIMATION.

IDENTIFIERS: (U) Gamma distribution functions.

AD-A188 257 12/2

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF MATHEMATICS

(U) An Extension of Aronszajn's Rule: Slicing the Spectrum for Intermediate Problems.

DESCRIPTIVE NOTE: Technical rept.,

AUG 87 17P

PERSONAL AUTHORS: Beattie, Christopher

CONTRACT NO. AFOSR-84-0326

MONITOR: AFOSR
TR-87-1614

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Numerical Analysis, v24 n4 p828-843 Aug 87.

ABSTRACT: (U) We introduce an equivalent formulation of Aronszajn's rule for the method of intermediate problems that provides more information of computational importance. The new formulation provides a mechanism for counting the number of intermediate problem eigenvalues in any given interval, thus allowing localization strategies to be developed analogous to Strum sequence strategies used in polynomial root finding. Additionally, the relationship of the eigenvector-free estimation method of Goerisch with intermediate problems is clarified. Keywords: Eigenvalue approximation, Intermediate problems, Aronszajn's rule.

DESCRIPTORS: (U) *EIGENVALUES, *APPROXIMATION(MATHEMATICS), FORMULATIONS, SEQUENCES, STRATEGY, REPRINTS, HILBERT SPACE, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Aronszajn rule, Gauss transformation.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 241 7/4

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Electrodeposition of Tin onto a Well-Defined Pt(111) Surface from Aqueous HBr Solutions. Studies by LEED and Auger Electron Spectroscopy,

MAR 86 4P

PERSONAL AUTHORS: Stickney, John L.; Schardt, Bruce C.; Stern, Donald A.; Wieckowski, Andrzej; Hubbard, Arthur T.

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-87-1603

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Electrochemical Society: Solid-State Science and Technology, v133 n3 p648-650 Mar 86.

ABSTRACT: (U) We wish to report an instance in which the energetic driving force for electrosorption, in this case the substantial affinity of tin oxygen monolayers for the Pt surface, was sufficient to cause spontaneous deposition of monolayer quantities of material upon immersion (of Pt into Sn(II) solutions) at open circuit. Since the electrodeposition of Sn species occurred without flow of current in the external circuit, the deposited species were detected, identified, and quantitated by Auger electron spectroscopy (1) along the lines of previous work from this laboratory (2). After cleaning and annealing, the electrode was examined by LEED and Auger spectroscopy to directly verify surface structural and compositional purity.

DESCRIPTORS: (U) *DEPOSITION, *ELECTRODEPOSITION, *QUANTITY, *TIN, ANNEALING, AUGER ELECTRON SPECTROSCOPY, COMPOSITION(PROPERTY), ENERGETIC PROPERTIES, LAYERS, OXYGEN, PURITY, STRUCTURAL PROPERTIES, SURFACES, PLATINUM, ELECTRON DIFFRACTION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

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AD-A188 239 6/4 6/11

BAYLOR COLL OF MEDICINE HOUSTON TX

(U) Noradrenaline and Beta-Adrenoceptor Agonists Increase Activity of Voltage-Dependent Calcium Channels in Hippocampal Neurons,

JUN 87 4P

PERSONAL AUTHORS: Gray, Richard; Johnston, Daniel

CONTRACT NO. AFOSR-85-0178

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-87-1592

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Nature, v327 n6123 p620-622, 18 Jun 87.

ABSTRACT: (U) The predominance of unconventional transmitter release sites at noradrenaline containing synapses and the diffuse projections of noradrenaline (NA) containing fibres originating in locus coeruleus have led to speculation that NA may act as a neuromodular in the central nervous system. Evidence suggests that it has a modulatory role in the plasticity of the developing nervous system in controlling behavioural states of an organism, and in learning and memory. Recently, Hopkins and Johnston demonstrated that NA enhances the magnitude, duration, and probability of induction of long term potentiation (LTP) at mossy fibre synapses in the hippocampal formation, and LTP is widely believed to be a cellular substrate for aspects of memory. To investigate the membrane e fects of NA on central neurones, we used a newly developed preparation in which patch clamp techniques can be applied to exposed adult cortical neurones. We report here that NA produces an enhancement in the activity of voltage dependent calcium channels in granule cells of the hippocampal dentate gyrus. This action of NA appears to be mediated by adrenoceptors and can be mimicked by cyclic AMP. Keywords: Hippocampus; Norepinephrine; Calcium channels; Single channels; Patch clamp; Reprints.

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DESCRIPTORS: (U) *NERVE TRANSMISSION, *NEUROCHEMISTRY, ADENOSINE PHOSPHATES, CALCIUM, CENTRAL NERVOUS SYSTEM, CHANNELS, CYCLIC COMPOUNDS, FIBERS, HIPPOCAMPUS, LEARNING, LEVARTERENOL, LOCUS, NERVE CELLS, NERVOUS SYSTEM, PLASTIC PROPERTIES, RELEASE, REPRINTS, SITES, SUBSTRATES, SYNAPSE, VOLTAGE, ION EXCHANGE, SODIUM, BEHAVIOR, MEMBRANES(BIOLOGY), MEMORY(PSYCHOLOGY), CELLS(BIOLOGY).

IDENTIFIERS: (U) Norepinephrine, Noradrenaline, Adrenoceptor, Beta adrenoceptors, Calcium channels, Agonists, Patch clamp, PE61102F, WUAFOSR2312A2.

AD-A188 233 12/5 25/5

CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING SYSTEMS

(U) Multiobjective Hierarchical Decision Problems in C3, III.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 84-31 May 85,

JUN 86 4P

PERSONAL AUTHORS: Papavassilopoulos, George P.

CONTRACT NO. F49620-84-C-0072

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1684

UNCLASSIFIED REPORT

ABSTRACT: (U) Two main lines of research were pursued under the support of this grant. The first one was the study of control laws in the presence of many controllers, each one of which has his own objective and information, the decisions of each one influence the information and objectives of the others and where the controllers ignore several of the parameters involved in the description of the system equation and objectives. Ideas from both Adaptive Control and Game Theory were combined in developing adaptive schemes for each controller, so that the behavior of the system gets closer and closer, as time goes by to the one that would result in the known parameter case. In the optimal shooting policy on a target that tries to escape, and in the optimal flashing policies of two opponents involved in a duel were studied.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *DECISION MAKING, *PROBLEM SOLVING, *COMMAND AND CONTROL SYSTEMS, ADAPTIVE SYSTEMS, CONTROL THEORY, EQUATIONS, GAME THEORY, POLICIES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 229 6/1 6/5 6/4

BAYLOR COLL OF MEDICINE HOUSTON TX DEPT OF NEUROLOGY

(U) 4-Aminopyridine Produces Epileptiform Activity in Hippocampus and Enhances Synaptic Excitation and Inhibition.

JUN 87 15P

PERSONAL AUTHORS: Rutecki, Paul A.; Lebeda, Frank J.; Johnston, Daniel

CONTRACT NO. DAMD17-86-C-6029, $AFOSR-85-0178

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1591

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Neurophysiology, v57 n6 p1911-1924 Jun 87.

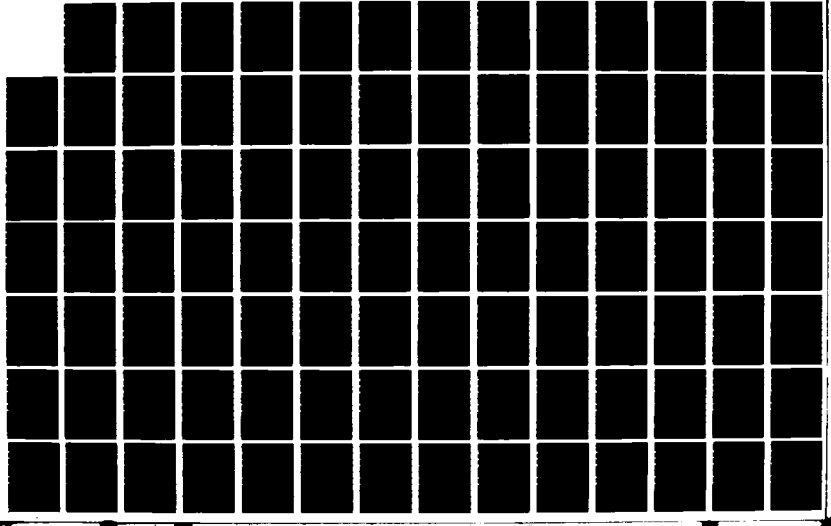
ABSTRACT: (U) Using extra- and intracellular recording techniques, the epileptiform activity in the CA3 subfield of rat hippocampal slices produced by low concentrations of 4-aminopyridine (4-AP) was investigated. At extracellular potassium concentrations between 1-10 milli moles, 5-10 micro moles 4-AP produced spontaneously occuring epileptiform discharges that were associated with an intracellularly recorded paroxysmal depolarizing shift (PDS). The 4-AP-induced PDS appeared to be composed of both inhibitory and excitatory synaptic potentials because of its complex waveform at depolarized membrane potentials. The depolarizing component's mean reversal potential measured using current-clamp techniques was-25. 7 mV. Using voltage-clamp techniques, the mean conductance of the depolarizing component was 110 nS with a reversal potential of -14.1 mV. To test the hypothesis that 4-AP was producing epileptiform activity in the presence of normal synaptic inhibition, the effects of 4-AP on mossy fiber evoked synaptic conductances were measured. 4-AP increased the excitatory, early inhibitory, and late inhibitory conductance changes in CA3 pyramidal neurons produced by mossy fiber stimulation. These results suggest that the epileptiform activity produced by 4-AP is, at least in part, a consequence of enhanced inhibitory and excitatory synaptic transmission and that epileptiform activity can occur without impairment of synaptic inhibition.

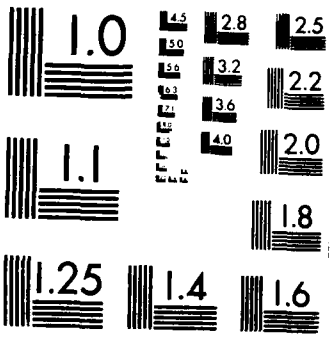
DESCRIPTORS: (U) *HIPPOCAMPUS, *SYNAPSE, *EPILEPSY, *NERVE TRANSMISSION, *PYRIDINES, *AMINES, CELLS(BIOLOGY), CONCENTRATION(COMPOSITION), EXCITATION, HYPOTHESES, INHIBITION, MEAN, POTASSIUM, RATS, RECORDING SYSTEMS, WAVEFORMS, STIMULATION(PHYSIOLOGY), NEUROCHEMISTRY, NERVE FIBERS.

IDENTIFIERS: (U) *H-Aminopyridine, Pyridine/4-Amino, Voltage clamp, PE61102F, WUAFOSR2312A2.

AD-A198 119 AFOSR TECHNICAL SUMMARIES(U) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC D TYRRELL MAR 88 AFOSR-TR-88-0757 4/8

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 208 12/5

CALIFORNIA UNIV BERKELEY

(U) Rational Arithmetic in Floating-Point.

DESCRIPTIVE NOTE: Final rept.,

SEP 86 12P

PERSONAL AUTHORS: Kahan, W.

CONTRACT NO. N00014-85-K-0180, DAAG29-85-K-0070

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1579

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contract AFOSR-84-0158.

ABSTRACT: (U) Professor Kahan pursued research to provide improved subroutines for common arithmetic functions for scientific computations. He produced an algorithm for the accurate implementation of rational arithmetic operations without resorting to multi-precision arithmetic. This was described in a paper entitled Rational arithmetic in floating point. He has also made a careful study of how to make branch cuts in the complex plane so as to allow evaluation of the dementary functions without any anomalies. This was presented in a talk at the conference on State-of -the-Art in Numerical Analysis held in Birmingham, England, April 14-18, 1986. Keywords: Computations.

DESCRIPTORS: (U) *SUBROUTINES, *FLOATING POINT OPERATION, ALGORITHMS, ARITHMETIC, COMPUTATIONS, FUNCTIONS(MATHEMATICS), NUMERICAL ANALYSIS, STATE OF THE ART.

AD-A188 207 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Some Majorization Inequalities for Functions of Exchangeable Random Variables.

DESCRIPTIVE NOTE: Technical rept.,

OCT 87 15P

PERSONAL AUTHORS: Boland, Philip J.; Proschan, Frank; Tong, Y. L.

REPORT NO. FSU-TR-M769

CONTRACT NO. F49620-85-C-0007, $NSF-DMS85-02346

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, AFOSR
TR-87-1599, TR-87-212

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper contains inequalities for the exceptions of permutation-invariant concave functions of the partial sums of nonnegative exchangeable random variables. Two majorization inequalities are derived, and an application in reliability theory is discussed. Keywords: Concave and Schurconcave functions.

DESCRIPTORS: (U) *INEQUALITIES, RANDOM VARIABLES, RELIABILITY, THEORY, PERMUTATIONS, PROBABILITY DENSITY FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 206 12/6

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Measurement and Analysis of Memory Conflicts on Vector Multiprocessors.

DESCRIPTIVE NOTE: Interim rept.,

OCT 87 36P

PERSONAL AUTHORS: Calahan, D. A.; Bailey, D. H.

CONTRACT NO. AFOSR-84-0096

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1601

UNCLASSIFIED REPORT

ABSTRACT: (U) The memory organization and technological design parameters which create memory access conflicts and affect performance of the CRAY family of processors are studied. Measurements on the dynamic-memory CRAY-2 system are presented.

DESCRIPTORS: (U) *MULTIPROCESSORS, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A188 206

AD-A188 205 5/8 6/10 12/9

PURDUE UNIV LAFAYETTE IN EEG SIGNAL PROCESSING LAB

(U) Electromagnetic Metrics of Mental Workload.

DESCRIPTIVE NOTE: Final rept. 15 Aug 85-14 Aug 86,

SEP 87 223P

PERSONAL AUTHORS: Aunon, J. I.; Kantowitz, B. H.; McGillem, C. D.; Plonski, M. P.

CONTRACT NO. AFOSR-85-0313

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-87-1663

UNCLASSIFIED REPORT

ABSTRACT: (U) Mental workload has been very difficult to describe quantitatively. An excessive workload can lead to a decrease in accuracy and performance, while a sustained high level of workload can lead to mental exhaustion. Previous research has indicated that heart rate variability and evoked potentials in the EEG (electroencephalogram) may be linked to mental workload. Unfortunately most of the work to date has examined these two biocybernetic variables independently rather than jointly. Recent advances now allow one to measure the magnetic fields produced by the brain (MEG) using a SQUID magnetometer (Superconducting Quantum Interference Devices). Much of the MEG research to date has concentrated on lower order brain processes rather than the higher cognitive processes associated with workload. The current research examines all these biocybernetic variables jointly in an effort to quantify mental workload. A paradigm was developed to vary several aspects of mental workload and verify the hybrid capacity model of human information processing that was developed at Purdue. This research included constructing a data acquisition system to implement this paradigm and simultaneously record heart rate, respiration, EEG & MEG data. It is believed that this is the first time that such a varied data set was recorded simultaneously.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 205 CONTINUED

DESCRIPTORS: (U) *CYBERNETICS, *INFORMATION PROCESSING, *MENTAL ABILITY, *WORKLOAD, *STRESS(PSYCHOLOGY), ACCURACY, BRAIN, COGNITION, DATA ACQUISITION, ELECTROENCEPHALOGRAPHY, FATIGUE(PHYSIOLOGY), HEART RATE, HUMANS, HYBRID SYSTEMS, INTERFERENCE, LINKAGES, MAGNETIC FIELDS, MAGNETOMETERS, MODELS, QUANTUM THEORY, RESPIRATION, SUPERCONDUCTIVITY, VARIABLES, VARIATIONS, PERFORMANCE(HUMAN).

IDENTIFIERS: (U) SQUID(Superconducting Quantum Interference Device), Evoked potentials, Event related potentials, PE61102F, LPN-PRF-1285-0604.

AD-A188 205

AD-A188 204 6/4 12/4

NORTHEASTERN UNIV BOSTON MA

(U) Center for the Study of Rhythmic Processes.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-1 Oct 87,

OCT 87 36P

PERSONAL AUTHORS: Kopell, Nancy; Cohen, Avis H.; Marder, Eve; Sigvardt, Karen A.

CONTRACT NO. F49620-87-C-0013

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR TR-87-1657

UNCLASSIFIED REPORT

ABSTRACT: (U) The Center for the Study of Rhythmic Processes began operation in the academic year 1986-87. It brought together mathematicians and biologists to work on problems of mutual interest. During the first year, the Center focused on two sets of problems. The first involved the structure and function of the intersegmental coordinating system of the vertebrate spinal cord, for which the lamprey provides an excellent model system. A broadly applicable mathematical framework was constructed for analyzing this system, and new mathematical techniques were invented. A new technology was put into use which has the potential of providing information not previously obtainable . Many of the major researchers working on this preparation were consolidated under the auspices of the center, and many new collaborations were formed. The other involved small neural networks, such as the stomatogastric ganglion of the lobster. Detailed mechanisms of function and control were investigated, and mathematical tools were applied to investigate how the circuits change under modulation. Keywords: Oscillators; Regeneration; Central pattern generators; Mathematical modeling; Sensory feedback; Neural networks; Neuromodulators.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *NEURAL NETS, *SPINAL CORD, *BIOLOGICAL RHYTHMS, CIRCADIAN RHYTHMS,

AD-A188 204

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 204 CONTINUED

FEEDBACK, GANGLIA, GENERATORS, LOBSTER, MATHEMATICAL ANALYSIS, MATHEMATICS, MODELS, MODULATION, OSCILLATORS, PATTERNS, PREPARATION, SENSES(PHYSIOLOGY), VERTEBRATES, SPINAL COLUMN.

IDENTIFIERS: (U) PE61103F, WUAFOSR3484A4.

AD-A188 160 12/6 20/4 5/1

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Specialized Instrumentation for Computational Fluid Dynamics Research.

DESCRIPTIVE NOTE: Final rept. 15 Jul 84-14 Feb 86,

JUN 87 4P

PERSONAL AUTHORS: Ghia, K. N.

CONTRACT NO. AFOSR-84-0275

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1175

UNCLASSIFIED REPORT

ABSTRACT: (U) A Perkin-Elmer 3250 MPS computer system was purchased. To assure more reliable operation, negotiations to replace this with a model 3280 MPS system were completed. Keywords: Computational fluid dynamics, Instrumentation.

DESCRIPTORS: (U) *COMPUTERS, COMPUTATIONS, FLUID DYNAMICS, RELIABILITY, PROCUREMENT, MILITARY RESEARCH, NUMERICAL METHODS AND PROCEDURES.

IDENTIFIERS: (U) Computational fluid dynamics, MPS-3250 computers, PE61102F, WUAFOSR2917A1.

AD-A188 158 11/6.1

PENNSYLVANIA STATE UNIV UNIVERSITY PARK

(U) High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.

DESCRIPTIVE NOTE: Annual rept. no. 2, 15 Aug 86-14 Aug 87,

SEP 87 34P

PERSONAL AUTHORS: Munn, B.; Park, S. W.; Simkovich, G.

CONTRACT NO. AFOSR-85-0298

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-1688

UNCLASSIFIED REPORT

ABSTRACT: (U) In the present investigation, the effects of dispersed SiO2 particles on the high temperature oxidation behavior of and alloys were studied. This study differs from previous investigations in that larger volume percents of SiO2 (5-40 vol%) were incorporated into the alloys. Kinetic studies were done using an automatic recording semi-micro balance under the desired conditions (1 atm O2 and 1273, 1373, 1373K). Surface topographies of oxidized specimens were also prepared and examined optically and by scanning electron microscopy. Standard x ray diffraction techniques were employed to identify the phases present in the scale. Based upon extensive results obtained for the Ni-Cr-SiO2 alloy a model for oxide formation in this system is proposed. The results obtained for the Fe based system will also be presented in this report.

DESCRIPTORS: (U) *OXIDATION, *NICKEL ALLOYS, *BINARY ALLOYS, CHROMIUM ALLOYS, DISPERSIONS, ELECTRON MICROSCOPY, ELECTRONIC SCANNERS, HIGH TEMPERATURE, KINETICS, PARTICLES, SURFACES, IRON ALLOYS, OXIDATION RESISTANCE, SILICON DIOXIDE, NITRIDES, OXIDES, PROTECTIVE COATINGS, MICROSTRUCTURE.

IDENTIFIERS: (U) Scanning Electron Microscopy, Ni-Cr and

AD-A188 158 CONTINUED

Fe-Cr, PE61102F, WUAFOSR2306A2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 137 9/1 20/12 20/7 20/3

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Jun 87,

OCT 87 116P

PERSONAL AUTHORS: Long, Stephen I.; Kroemer, Herbert; Rao, M. A.

CONTRACT NO. AFOSR-82-0344

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-87-1655

UNCLASSIFIED REPORT

ABSTRACT: (U) The following describes the results of research on III-V molecular beam epitaxial (MBE) growth, material characterization and the fabrication of heterostructure bipolar transistors (HBT) for very-high-speed logic applications. Work on the InGaP/GaAs heterojunction (HJ) was completed. Isotype HJs were grown and evaluated by a CV reconstruction method in order to determine the energy band offsets. It was found that delta Ec = 0.22 eV and delta Ev = 0.24 eV for the lattice matched composition. An inverted AlGaAs/GaAs HBT was investigated, and it was shown that an undoped, graded region between emitter and base would eliminate the conduction band spike and provide a buffer for Be diffusion. A new direction toward improvement in performance and fabrication techniques for the AlGaAs/GaAs HBT was successfully demonstrated. Graded-bandgap nonalloyed ohmic contacts using n+ InAs for the AlGaAs emitter and p+ GaSb for the GaAs base were provided by selective epitaxial regrowth. The MBE growth conditions for grading from GaAs to InAs and GaAs to GaSb were determined. Low specific contact resistances were observed for both contact types. A self-aligned AlGaAs/GaAs HBT with graded-gap contacts to both base and emitter was demonstrated.

AD-A188 137

AD-A188 137 CONTINUED

DESCRIPTORS: (U) *BIPOLAR TRANSISTORS, *ELECTRIC CONTACTS, *GALLIUM ARSENIDES, *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *HETEROJUNCTIONS, *MOLECULAR BEAMS, ENVIRONMENTS, GROWTH(GENERAL), HIGH VELOCITY, LOGIC, PLANAR STRUCTURES, RESISTANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A188 111 12/5 12/6

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) A Generalized DBMS to Support Diversified Data.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-31 Mar 87,

JUL 87 55P

PERSONAL AUTHORS: Stonebraker, Michael; Rowe, Lawrence; Wong, Eugene

CONTRACT NO. AFOSR-83-0254

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-87-1682

UNCLASSIFIED REPORT

ABSTRACT: (U) This project supported an investigation into extending a relational system to support new kinds of data objects such as lines, points, polygons, bit maps, text, documents, vectors and arrays. Two important tactics were studied: 1) use of an abstract data type system (ADT); and 2) use of procedural objects. Basically an ADT system allows new data types to be added to a relational system to augment the normal character strings, integers and floating point numbers traditionally provided. In addition, procedures provide a powerful data modeling capability that is especially useful for complex objects or objects that have unpredictable composition. The important results that the authors achieved are twofold. First, they obtained results on the integration of an ADT system into a general purpose DBMS. In particular, they discovered how to integrate new data types with query optimization routines and how to allow new access methods to be constructed for the new data types. Second, they designed a syntax for efficient manipulation of procedural objects and then constructed query optimization algorithms to efficiently process this extended syntax.

DESCRIPTORS: (U) *DATA MANAGEMENT, *COMPUTER PROGRAMMING, *DATA BASES, ABSTRACTS, ACCESS, ALGORITHMS, FLOATING POINT OPERATION, INFORMATION SYSTEMS, INTEGRATION,

AD-A188 111

AD-A188 111 CONTINUED

INTERROGATION, MODELS, NUMBERS, OPTIMIZATION, SYNTAX, COMPUTER APPLICATIONS, DOCUMENTS, DATA PROCESSING, PROGRAMMING LANGUAGES.

IDENTIFIERS: (U) ADT(Abstract Data Type), DBMS(Data Base Management Systems), PE61102F, WUAFOSR2304A2.

AD-A188 111

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 093 20/12 7/4

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

(U) Plasma Deposition of Silicon Carbide Thin Films.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-31 Jul 87,

AUG 87 81P

PERSONAL AUTHORS: Partlow, W. D.; Choyke, W. J.; Yates, John T., Jr.; Kline, L. E.; Bozack, M. J.

REPORT NO. 87-9C7-OPSIC-R1

CONTRACT NO. F49620-84-C-0063

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR TR-87-1693

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the work performed on a three year program to obtain an understanding of deposition processes of thin films from plasmas. Deposition plasmas of methane and of methane-hydrogen and methane-silane mixtures were characterized via electrical, optical, and mass spectroscopic measurements. Surface chemical studies of the fundamental surface reactions were performed, and a model was constructed which takes into account both gas phase and the surface processes leading to deposition. The properties of the deposited films were related to the plasma conditions associated with their deposition. Advances in process modeling and surface chemical techniques were achieved on this program, in addition to the knowledge that was gained about the specific plasma deposition processes that were studied.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *SILICON CARBIDES, *THIN FILMS, *VAPOR DEPOSITION, CHEMICAL ENGINEERING, CHEMISTRY, DEPOSITION, FILMS, MASS SPECTROSCOPY, METHANE, SURFACE CHEMISTRY, SURFACE REACTIONS, SURFACES, VAPOR PHASES, THERMOCHEMISTRY, CHEMICAL BONDS, CRYSTALLOGRAPHY, MOLECULAR BEAMS, SILANES, AMORPHOUS MATERIALS, MODELS, HYDROGENATION.

AD-A188 093

AD-A188 093 CONTINUED

IDENTIFIERS: (U) Carbon films, PE61102F, WUAFOSR2306B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 092 11/6.1 20/12

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Strength and Structure of Ga sub 1-x In sub x As Alloys.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-31 Aug 87,

SEP 87 45P

PERSONAL AUTHORS: Faber, Katherine T.; Hirth, John P.

CONTRACT NO. F49620-85-C-0129, $$ARPA Order-5526

MONITOR: AFOSR TR-87-1633

UNCLASSIFIED REPORT

ABSTRACT: (U) Solid solution strengthening of GaAs by In atoms acting as InAs 4 units has been predicted for an intermediate temperature, plateau region. This strengthening could partially account for the reduction in dislocation density in crystals grown from the melt. Deformation studies of undoped and In-doped (1-2X 10 to the 20th atoms/cc-3 GaAs were performed in compression in the temperature range 500 - 1100 C at a strain rate of . 0001/s in both multiple slip, 001, and single slip, 123, orientations. The critical resolved shear stress is nearly doubled with indium additions, but both undoped and In-doped materials show a weakly temperature independent critical resolved shear stress, expected from the solid solution strengthening model. The results also showed that the onset of dynamic recovery occurred at higher stress and strain levels for the In-doped materials, suggesting that the climb process is more difficult in these alloys.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *INDIUM, ATOMS, CRYSTALS, DEFORMATION, DENSITY, DISLOCATIONS, DYNAMICS, MODELS, RECOVERY, SHEAR STRESSES, SOLID SOLUTIONS, STRAIN(MECHANICS), STRENGTH(MECHANICS), STRESSES, TEMPERATURE, COMPRESSIVE PROPERTIES, DOPING, HARDENING, CADMIUM TELLURIDES, MANGANESE, STRAIN RATE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3, OSURF-764977, OSURF-717636.

AD-A188 092

AD-A188 086 12/4

LOYOLA UNIV OF CHICAGO IL DEPT OF MATHEMATICAL SCIENCES

(U) Viscosity Methods in Optimal Control of Distributed Systems.

DESCRIPTIVE NOTE: Annual technical rept. 1 Aug 86-15 Aug 87,

AUG 87 4P

PERSONAL AUTHORS: Barron, Emmanuel N.

CONTRACT NO. AFOSR-86-0202

PROJECT NO. 2304

TASK NO. K5

MONITOR: AFOSR TR-87-1827

UNCLASSIFIED REPORT

ABSTRACT: (U) The rigorous connection between viscosity solutions for the Bellman equation in optimal control and the Pontryagin Maximum Principle has been established. The method developed for controlled ordinary differential equations was extended to infinite dimensions to derive the Pontryagin principle for 1) a class of controlled nonlinear evolution equations in a Hilbert space, 2) a class of controlled nonlinear, divergence form parabolic partial differential equations; and 3) a class of differential-difference equations. Additional subjects were studied were the extension of the idea of viscosity solution to equations with only time-measureable Hamiltonians and the optimal cooling of a free boundary problem with Stefan problem dynamics. Two problems of interest in specific applications were solved. The optimal control is characterized in the class of monotone functions which minimizes the H1 distance to a given function. This problem, a specific monotone follower problem, arises in production planning. An optimal portfolio selection problem is considered which includes stock, options, bonds and borrowed cash at an interest rate different from the bond interest rate. This problem is formulated using stochastic optimal control and explicitly constructed the solution of the Bellman equation. The objective of the study was to derive the

AD-A188 086

AD-A188 086 CONTINUED

option price which the market sets to minimize the investor's maximal expected utility of wealth.

DESCRIPTORS: (U) *STOCHASTIC CONTROL, *CONTROL THEORY, BOUNDARY VALUE PROBLEMS, CONTROL, COOLING, DIFFERENTIAL EQUATIONS, DISTRIBUTION, DYNAMICS, EQUATIONS, EVOLUTION(GENERAL), HILBERT SPACE, MARKETING, MONOTONE FUNCTIONS, NONLINEAR ALGEBRAIC EQUATIONS, OPTIMIZATION, PARABOLAS, PARTIAL DIFFERENTIAL EQUATIONS, PLANNING, PRODUCTION, SOLUTIONS(GENERAL), VISCOSITY, HAMILTONIAN FUNCTIONS.

IDENTIFIERS: (U) Bellman equation, Pontryagin Maximum Principle, Stefan problem, Parabolid differential equations, Hamilton Jacobi equations, PE61102F, WUAFOSR2304K5.

AD-A188 086

AD-A188 082 7/3

SAN DIEGO STATE UNIV CA DEPT OF CHEMISTRY

(U) Silylene Reactions with Ethylene and Butadiene: Mechanism and Kinetics,

87 7P

PERSONAL AUTHORS: Rogers, D. S.; Walker, K. L.; Ring, M. A.; O'Neal, H..E.

CONTRACT NO. AFOSR-83-0209

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1940

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v6 n11 p2313-2318 1987.

ABSTRACT: (U) The reactions of SiH2 (generated from the disilane pyrolysis with ethylene and with butadiene have been studied by the comparative rate technique. Ethylene trapping of silylene is a consecutive step process involving the formation of a silacyclopropane intermediate which can react back to reactants or forward to either ethylsilylene or vinylsilane. Reaction products of ethylene trapping vary with reaction conditions. At high reactant concentrations and low temperatures the main product is ethylsilane, but numerous other products including diethylsilane and ethyldisilane are also formed. At low reactant concentrations and moderate temperatures the main products are ethylsilane and vinylsilane, while at high temperatures vinylsilane is the only significant product. A number of rate constants and rate-constant parameters for the relevant reactions of the proposed rather complex mechanism have been estimated by using a variety of data sources. Keywords: Kinetics, Silylene disilane, Ethylene, Butadiene, Silacyclopropanes.

DESCRIPTORS: (U) *ETHYLENE, *SILANES, *REACTION KINETICS, *BUTADIENES, CONSTANTS, CYCLOPROPANES, HIGH TEMPERATURE, LOW TEMPERATURE, PYROLYSIS, RATES, REACTANTS(CHEMISTRY), RESPONSE, SILICON COMPOUNDS, LITHIUM COMPOUNDS, ALUMINUM

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AD-A188 082 CONTINUED

COMPOUNDS, METHYL RADICALS.

IDENTIFIERS: (U) *Silylenes, PE61102F, WUAFOSR2303B2.

AD-A188 050 20/4 12/5

TEXAS UNIV AT AUSTIN COLL OF ENGINEERING

(U) A Code Development System for Computational Fluid Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

SEP 87 11P

PERSONAL AUTHORS: Anderson, Dale A.

CONTRACT NO. AFOSR-86-0293

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR
TR-87-1708

UNCLASSIFIED REPORT

ABSTRACT: (U) The first and largest color Sun 3/160C in the CFD workstation network was purchased with funds made available through this grant. This workstation has been used as a server and general computational node, as well as a workstation. Research Projects: Development of Adaptive Grid Schemes based on Poisson Grid Generators; A Zonal Method for Extending the Applicability of the Parabolized Navier Stokes Equations; and Numerical Simulation of Helicopter Rotor Flowfields.

DESCRIPTORS: (U) *FLOW FIELDS, *POLARIZATION, ADAPTIVE SYSTEMS, CODING, COMPUTATIONS, FLUID DYNAMICS, GENERATORS, GRIDS, HELICOPTER ROTORS, MATHEMATICAL MODELS, NAVIER STOKES EQUATIONS, NETWORKS, NODES, NUMERICAL ANALYSIS, POISSON DENSITY FUNCTIONS, STATIONS, WORK, ALGORITHMS, NUMERICAL METHODS AND PROCEDURES.

IDENTIFIERS: (U) Computational fluid dynamics, Sun computers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 029 20/4

CALSPAN UB RESEARCH CENTER BUFFALO NY

(U) Shock Wave/Turbulent Boundary Layer Interaction in High-Reynolds-Number Hypersonic Flows.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 85-30 Sep 86,

JUL 87 137P

PERSONAL AUTHORS: Holden, M. S.; Havener, A. G.; Lee, C. H.

REPORT NO. CUBRC-86681

CONTRACT NO. F49620-85-C-0130

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-87-1587

UNCLASSIFIED REPORT

ABSTRACT: (U) This report investigated fundamental aerothermal phenomena in hypersonic flow, with particular emphasis on viscous/inviscid interaction phenomena. The experimental studies were conducted to examine the changes in the structure at the base of a hypersonic turbulent boundary layer as it is subjected to a strong self-induced pressure gradient in regions of shock wave/boundary layer interaction. The initial phase of the theoretical program was directed toward summarizing existing techniques for obtaining Navier/Stokes solutions for laminar flow over flat plates in hypersonic flow. In the experimental program, surface and flow field measurements were made to examine the detailed flow mechanics associated with turbulent boundary layer separation over a large cone flare model at Mach numbers 11, 13 and 16 and Reynolds numbers up to 100 million. Holography measurements were used to examine the flow field regions of hypersonic shock wave/turbulent boundary layer interaction. In this preliminary investigation of the application of holography in a 96 inch Shock Tunnel, holographic interferograms were obtained for viscous/inviscid interactions at Mach numbers 11 and 13 and Reynolds numbers up to 30 million, nominally. Flow field

AD-A188 029

AD-A188 029 CONTINUED

studies were made for flat plate/wedge, cone/flare and incident shock configurations. The quantitative results presented offer new information as well as a potential to obtain density measurements in other types of hypersonic flow; however, they also reveal important concerns which need to be resolved before the interferometric data can be claimed to give accurate measurements of these flows. Two appendices include an invited review paper on aerothermal problems associated with hypersonic flight.

DESCRIPTORS: (U) *AEROTHERMODYNAMICS, *FLOW, *HYPERSONIC FLOW, *INTERACTIONS, *INVISCID FLOW, *MECHANICS, *TURBULENT BOUNDARY LAYER, *SHOCK WAVES, BOUNDARY LAYER FLOW, DENSITY, EXPERIMENTAL DATA, FLAT PLATE MODELS, FLOW FIELDS, FLOW SEPARATION, HOLOGRAPHY, HYPERSONIC FLIGHT, INTERFEROGRAMS, INTERFEROMETRY, LAMINAR FLOW, MEASUREMENT, NAVIER STOKES EQUATIONS, PRESSURE GRADIENTS, REYNOLDS NUMBER, SHOCK TUNNELS, VISCOSITY, VISCOUS FLOW, WEDGES, MACH NUMBER.

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 028 20/4 21/5

VRIJE UNIV BRUSSELS (BELGIUM) DEPT OF FLUID MECHANICS

(U) Radial Mixing in Turbomachines.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 85-31 Aug 86,

APR 87 80P

PERSONAL AUTHORS: DeRuyck, J.; Hirsch, Ch.; Toorman, E.

REPORT NO. VUB-TN-39

CONTRACT NO. AFOSR-85-0167

PROJECT NO. 2307

TASK NO. 51

MONITOR: AFOSR
TR-87-1423

UNCLASSIFIED REPORT

ABSTRACT: (U) The main tools for the prediction of convective radial mixing are developed. The secondary flows needed for the convective mixing are found from pitch averaged vorticity equations combined with integral methods for the computation of 3d end-wall boundary layers, 3d profile boundary layers and 3d asymmetric wakes. This integral approach requires less approximations than previous radial mixing theories and only three empirical constants are required. The convective mixing coefficient of Adkins and Smith is found from the resulting secondary flow velocities. The method is applied to some standard test cases, where secondary flow patterns are compared with available test data.

DESCRIPTORS: (U) *SECONDARY FLOW, *RADIAL FLOW, COEFFICIENTS, CONSTANTS, CONVECTION, EQUATIONS, EXPERIMENTAL DATA, MIXING, PATTERNS, THEORY, VELOCITY, VORTICES, AXIAL FLOW COMPRESSORS, BOUNDARY LAYER FLOW, THREE DIMENSIONAL FLOW, MATHEMATICAL PREDICTION, VORTICES, BELGIUM.

IDENTIFIERS: (U) End walls, *Radial mixing, EWBL(End Wall Boundary Layer).

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AD-A188 021 7/2 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Investigation of Defect and Electronic Interactions Associated With GaAs Device Processing.

DESCRIPTIVE NOTE: Annual rept. 16 Aug 86-15 Aug 87,

AUG 87 25P

PERSONAL AUTHORS: Gatos, Harry C.; Lagowski, Jacek

CONTRACT NO. AFOSR-86-0342

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-87-1906

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on new semi-insulating behaviour in III-V compounds completed the determination of electronic levels and related optical properties of substitutional titanium in bulk grown InP and GaAs. In the course of the corresponding crystal growth study we have also identified impurity gettering by transition elements. This gettering takes place due to melt (or solution), and it can be beneficial or detrimental for obtaining SI materials. An example of the beneficial role is provided by the interaction of vanadium with silicon, which reduces Si donor concentration in the grown crysta'. An example of detrimental effect is provided by the interaction of titanium with carbon, which reduces the concerntration of deep compensating Ti donors in epitaxial or melt grown crystals. Appropriate redesign of the epitaxial growth ceil (eliminating all graphite elements in contact with the solution) is in progress. An investigation has been carried out on the extension of liquid phase electroepitaxy to the growth of bulk InGaAs crystals. We have successfully developed procedures for the electroepitaxial growth of InGaAs ingots 14 mm in diameter and up to 3 mm thick. To our knowledge, these are the first bulk InGaAs crystals to show excellent compositional uniformity (in accord with theoretical predictions for electroepitaxy).

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AD-A188 021 CONTINUED

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *GALLIUM ARSENIDES, *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *PROCESSING, CARBON, CELLS, COMPENSATION, CRYSTAL GROWTH, CRYSTALS, DETERMINATION, ELECTRON ENERGY, ELECTRONICS, ENERGY LEVELS, GETTERING, GRAPHITE, IMPURITIES, INTERACTIONS, MELTS, OPTICAL PROPERTIES, PREDICTIONS, SILICON, THEORY, TITANIUM, VANADIUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A188 020 20/4 21/5 20/13

OXFORD UNIV (ENGLAND) DEPT OF ENGINEERING SCIENCE

(U) Wake Interaction Effects on the Transition Process on Turbine Blades.

DESCRIPTIVE NOTE: Rept. 1 Sep 86-31 Aug 87,

OCT 87 33P

PERSONAL AUTHORS: Ainsworth, R. W.; LaGraff, J. E.

REPORT NO. SCIENTIFIC-2

CONTRACT NO. AFOSR-85-0295

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-87-1919

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Syracuse Univ. NY. Dept. of Mechanical and Aerospace Engineering.

ABSTRACT: (U) The characterisation of the nozzle guide vane inlet and exit conditions in the Oxford University Isentropic Light Piston Tunnel fully 3-D annular rotating stage has been undertaken Measurements included hot wire anemometry and pressure/Mach number distributions. Preparations for the rotor heat transfer instrumentation/ data acquisition hardware and software are also in progress. Further development of a numerical model to predict the effects of wake passing and transition is reported. The convection of the wake through the passage is predicted, allowing for estimations of the expected times for which the boundary layer is disturbed by the wake fluid. The new model for the random generation and subsequent growth and convection of the turbulent spots produces a time-resolved prediction of the intermittent heat transfer signals by use of a time-marching procedure. By superimposing the two numerical models it is possible to simulate the measured instantaneous heat transfer characteristics and to estimate the effective average intermittency along the blade surface and compare the results to the measured intermittency values.

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AD-A188 020

AD-A188 020 CONTINUED

DESCRIPTORS: (U) *BOUNDARY LAYER TRANSITION, *HEAT TRANSFER, *GAS TURBINE BLADES, *WAKE, COMPUTER PROGRAMS, ESTIMATES, EXITS, FLUIDS, GUIDE VANES, HOT WIRE ANEMOMETERS, INLETS, INTERACTIONS, MACH NUMBER, MATHEMATICAL MODELS, GAS TURBINE NOZZLES, MATHEMATICAL PREDICTION, PREPARATION, PRESSURE DISTRIBUTION, SIGNALS, SURFACES, TIME, TRANSITIONS, TURBULENCE, INLET GUIDE VANES, SKIN FRICTION, AEROTHERMODYNAMICS, GAS TURBINE ROTORS, GREAT BRITAIN.

IDENTIFIERS: (U) Unsteady wake interactions, PE61102F, WUAFOSR2307A4.

AD-A188 020

AD-A188 019 17/9 20/6

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES OPTICAL MATERIALS AND DEVICES L AB

(U) Integrated Optical Synthetic Aperture Radar Processor.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-30 Nov 85,

SEP 87 53P

PERSONAL AUTHORS: Tanguay, Armand R., Jr

REPORT NO. USC/OMDL-1601

CONTRACT NO. AFOSR-84-0352

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-87-2026

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this research program was initiation of the development of a compact, rugged, low-cost, low-power optical synthetic aperture radar processor for real time image formation aboard airborne and spaceborne platforms. The extremely high computational burden associated with SAR imaging has thus far limited the usefulness of the technique to non-real-time applications from fixed platform bases. Existing realtime digital and optical techniques are in general too bulky, power consumptive, and expensive for broad applicability, particularly in space-confined mobile environments. The integrated optics approach described herein provides a powerful solution with which to circumvent these limitations. Keywords: Optical information processing, Optical computing, Integrated optics, Guided wave optics, and Synthetic aperture radar.

DESCRIPTORS: (U) *IMAGES, *INTEGRATED SYSTEMS, *OPTICAL PROCESSING, *PROCESSING EQUIPMENT, *RADAR, *REAL TIME, COMPUTATIONS, DIGITAL SYSTEMS, FLYING PLATFORMS, METHODOLOGY, OPTICAL DATA, OPTICAL WAVEGUIDES, OPTICS, SPACEBORNE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A188 019

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A188 018 21/2 7/4 7/3

EMORY UNIV ATLANTA GA

(U) Combustion of Hydrogen and Hydrocarbons in Fluorine.

DESCRIPTIVE NOTE: Annual rept. Sep 86-Aug 87,

SEP 87 5P

PERSONAL AUTHORS: Kaufman, Myron

CONTRACT NO. AFOSR-84-0196

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-87-1905

UNCLASSIFIED REPORT

ABSTRACT: (U) In this program, low pressure flames of hydrogen and hydrocarbons burning in fluorine are studied by measuring ionization, luminescence and laser induced fluorescence of intermediates. Oscillatory and pulsing behavior are noted in these flames. Experiments are designed to establish the mechanism of CH A-state emission in oxygen free combustion. Theoretical consideration of the long time behavior of bimolecular reactions has provided a general endpoint indicator for chemiluminescent gas phase titration reactions as well as a means of measuring rate constants for reactions such as H + F combination. Keywords: Fluorine, Combustion, Kinetics, Oscillation, Titration.

DESCRIPTORS: (U) *COMBUSTION, *HYDROCARBONS, *HYDROGEN, *REACTION KINETICS, CONSTANTS, FLAMES, FLUORINE, IONIZATION, LASER INDUCED FLUORESCENCE, LONG RANGE(TIME), LOW PRESSURE, LUMINESCENCE, MEASUREMENT, MOLECULES, OSCILLATION, OXYGEN, RATES, DIATOMIC MOLECULES, STOICHIOMETRY, VAPOR PHASES, MOLECULE MOLECULE INTERACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A188 014 9/1 20/10

CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS

(U) Quantum Limits of Superconducting Heterodyne Receivers.

DESCRIPTIVE NOTE: Annual technical rept. 15 May 86-14 May 87,

OCT 87 5P

PERSONAL AUTHORS: Richards, Paul L.

CONTRACT NO. AFOSR-85-0230

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR
TR-87-1692

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research is to produce quantum limited SIS quasiparticle heterodyne receivers at submillimeter wavelengths. The approach is to compare the performance of waveguide and planar lithographed quasi-optical SIS mixers in W-band (lambda approx. 3mm) in order to understand the factors which upgrade the performance of the latter. This information will be used to optimize the planar quasi-optical mixers. Finally, these optimized designs will be scaled to submillimeter wavelengths. Systematic tests of both types of mixers have been carried out during the second grant year. Improved designs of planar quasi-optical mixers gave been designed and fabricated. The construction of test apparatus for submillimeter wavelengths has begun.

DESCRIPTORS: (U) *QUANTUM THEORY, *RECEIVERS, CONSTRUCTION, HETERODYNING, LIMITATIONS, PARTICLES, SUBMILLIMETER WAVES, WAVEGUIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3.

AD-A188 018

AD-A188 014

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 982 14/2 9/3 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Development and Application of Oxygen Flow Tagging for Velocity Measurements and Flow Visualization in Turbulent Three-Dimensional Supersonic Flows.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 86-31 May 87,

SEP 87 38P

PERSONAL AUTHORS: Miles, Richard B.

CONTRACT NO. AFOSR-86-0191

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1707

. UNCLASSIFIED REPORT

ABSTRACT: (U) During this first year, research has concentrated on the acquisition of laser systems and the construction of our test facility. We have achieved two major research milestones: the demonstration of velocity tagging, and the demonstration of the simultaneous measurement of two-dimensional temperature and pressure fields. We are currently studying the nonlinear effects associated with high intensity laser fields with a particular interest in how they affect the measurements of flow properties. Keywords: Flow diagnostics; Velocity measurements; Temperature measurements; Density measurements; Laser diagnostics; Supersonic flows; Turbulent three dimensional flow.

DESCRIPTORS: (U) *LASERS, *OXYGEN, *SUPERSONIC FLOW, ACQUISITION, DEMONSTRATIONS, DENSITY, DIAGNOSIS(GENERAL), GAS FLOW, FLOW VISUALIZATION, HIGH RATE, INTENSITY, MEASUREMENT, NONLINEAR SYSTEMS, PRESSURE MEASUREMENT, SYNCHRONISM, TEMPERATURE, TEST FACILITIES, THREE DIMENSIONAL FLOW, TURBULENT FLOW, TWO DIMENSIONAL, VELOCITY, RAMAN SPECTRA, LABELED SUBSTANCES, EXCITATION, MOLECULAR VIBRATION, WIND TUNNEL NOZZLES, LASER INDUCED FLUORESCENCE, NEODYMIUM LASERS, DYE LASERS, LASER BEAMS,

AD-A187 982

AD-A187 982 CONTINUED

TUNABLE LASERS, RAYLEIGH SCATTERING.

IDENTIFIERS: (U) Laser diagnostics, Neodymium YAG lasers, RELIEF(Raman Excitation and Laser Induced Electronic Fluorescence), Oxygen tagging, Argon fluoride lasers, PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 981 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Probability Bounds for M-Skorohod Oscillations.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

DEC 86 18P

PERSONAL AUTHORS: Avram, Florin; Taqqu, Murrad S.

REPORT NO. TR-173

CONTRACT NO. F49620-85-C-0144, $NSF-ECS86-96090

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1004

UNCLASSIFIED REPORT

ABSTRACT: (U) Billingsley developed a widely used method for proving weak convergence with respect to the sup-norm and J -Skorohod topologies, once convergence of the finite-dimensional distributions has been established. Billingsley's method works not only for J oscillations, but also for M oscillations. This is done by identifying a common property of the J and M functions, called sub-triadditivity, and then showing that Billingsley's approach in the case of the J function can be adequately modified to apply to any sub-triadditive function. Keywords: Weak convergence; Skorohod topologies; Sub-triadditivity.

DESCRIPTORS: (U) *WEAK CONVERGENCE, DISTRIBUTION, OSCILLATION, SIZES(DIMENSIONS), TOPOLOGY.

IDENTIFIERS: (U) Billingsley method, Skorohod topology, PE61102F, WUAFOSR2304A5.

AD-A187 980 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Optimal Recursive Maximum Likelihood Estimation,

MAR 87 2P

PERSONAL AUTHORS: Ljung, Lennart; Mitter, Sanjoy K.; Moura, Jose M.

REPORT NO. LIDS-P-1660

CONTRACT NO. AFSR-85-0227

MONITOR: AFOSR
TR-87-1495

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper derives stochastic differential equations for recursive maximum likelihood estimates for the joint filtering parameter estimation problem. Keywords: Maximum likelihood estimates; Stochastic differential equation; Hamilton Jacobi equation; Nonlinear filtering; Reprints.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, NONLINEAR DIFFERENTIAL EQUATIONS, OPTIMIZATION, NONLINEAR SYSTEMS, REPRINTS, STOCHASTIC PROCESSES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 953 11/6.1 11/6.2

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Power Metallurgy Processing.

DESCRIPTIVE NOTE: Annual technical rept. no. 2,

OCT 81 89P

PERSONAL AUTHORS: Fraser, Hamish L.

CONTRACT NO. AFOSR-85-0191

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-1584

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers the progress made in the second year of a three study on the application of rapid solidification processing (RSP) to Al and Mg alloys. The main emphasis of this study has been on the understanding of the microstructures produced by rapid solidification. The alloy systems studies include: 1) Al alloys for elevated temperature applications, namely Al-8Fe-2Mo with additions of Si, and 2) Mg alloys for elevated temperature applications, namely, Mg-Gd,Mg-Li,Mg-Li-Si. Keywords: Physical metallurgy; Magnesium; Lithium; Silicon; Gadolinium; Hardness; Tensile strength.

DESCRIPTORS: (U) *MAGNESIUM ALLOYS, *SOLIDIFICATION, *ALUMINUM ALLOYS, *POWDER METALLURGY, AEROSPACE SYSTEMS, GADOLINIUM, HIGH TEMPERATURE, LITHIUM, MAGNESIUM, METALLURGY, MICROSTRUCTURE, PHYSICAL METALLURGY, SILICON, TENSILE STRENGTH, HEAT TREATMENT, PHASE TRANSFORMATIONS, MICROSTRUCTURE, EUTECTICS, CRACKS, MICROHARDNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

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AD-A187 952 21/3 20/9 14/2

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) Summary of Equipment Purchased and Description of Its Use: Support of Research in Beamed Energy Propulsion.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-1 Mar 86,

MAR 86 11P

PERSONAL AUTHORS: Krier, Herman; Mazumder, Jyoti; Glumb, Ron J.

CONTRACT NO. AFOSR-84-0291

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1428

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents the description equipment purchased, the cost of that equipment, and how the equipment is being utilized to carry out research in the study of plasmas formed from high energy lasers. The program was funded by DoD as part of the University Research Instrumentation Program (URIP). Important results of the thermodynamic and heat transfer associated with laser sustained plasmas are presented. Keywords: Diagnostic equipment, Temperature measurement, Beamed laser energy, Propulsion.

DESCRIPTORS: (U) *DIAGNOSTIC EQUIPMENT, *PLASMA ENGINES, *LABORATORY EQUIPMENT, COSTS, ENERGY, HEAT TRANSFER, HIGH ENERGY, INSTRUMENTATION, MEASUREMENT, PLASMAS(PHYSICS), PROPULSION SYSTEMS, TEMPERATURE, THERMODYNAMICS, LASER PUMPING, LASER INDUCED FLUORESCENCE, DYE LASERS, EXCIMERS.

IDENTIFIERS: (U) *Laser produced plasmas, Laser propulsion, PE61102F, WUAFOSR2917A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 943 6/4 5/8

SMITH-KETTLEWELL EYE RESEARCH FOUNDATION SAN FRANCISCO CA

(U) Visual Processing of Object Velocity and Acceleration.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 86-30 Sep 87.

NOV 86 4P

PERSONAL AUTHORS: McKee, Suzanne P.

CONTRACT NO. AFOSR-85-0380

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-87-1833

UNCLASSIFIED REPORT

ABSTRACT: (U) Human observers have difficulty detecting acceleration in a moving visual image. If observers are shown two briefly-presented (100 msec) moving targets, one after the other, they can learn to discriminate a 6% difference in their velocities. If instead, a single target is presented moving at one velocity (reference velocity), which abruptly changes to a new velocity of 100 msec, and then returns to the initial velocity, a difference of 6% is virtually undetectable. Even when a jerk or perturbation in the trajectory is detected, observers frequently have difficulty saying whether the target increased or decreased its velocity. In short, the reference velocity is masking the incremental change. A number of experiments were performed to explore the influence of velocity, spatial extent, and trajectory discontinuities on masking effect. Keywords: Target recognition; Target discrimination; Moving target indicators.

DESCRIPTORS: (U) *IMAGE PROCESSING, *MOVING TARGET INDICATORS, *SPACE PERCEPTION, ACCELERATION, DISCONTINUITIES, HUMANS, MASKING, MOTION, MOVING TARGETS, OBSERVERS, OPTICAL IMAGES, TARGET DISCRIMINATION, TARGET RECOGNITION, TRAJECTORIES, VELOCITY, VISION, VISUAL PERCEPTION.

AD-A187 943

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IDENTIFIERS: (U) *Motion perception, PE61102F, WUAFOSR2313A5.

AD-A187 943

AD-A187 942 6/4 5/10

SMITH-KETTLEWELL EYE RESEARCH FOUNDATION SAN FRANCISCO CA

(U) Visual Evoked Potentials.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 86-31 Aug 87,

NOV 87 5P

PERSONAL AUTHORS: Nakayama, Ken

CONTRACT NO. AFOSR-83-0320

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-87-1831

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress over the past year has been rapid and wide ranging, covering two primary areas. First, in the area of visual attention, we have shown both the existence of a sustained and a transient component of enhanced pattern recognition. This cannot be explained by visual transients or eye movements. Second, we have examined a wide range of issues related to partial visibility (occlusion) using stereoscopic displays. In particular, we have shown that pattern recognition of partially hidden objects is superior if the pattern is in a rear vs. front stereoscopic plane, that the solution to the aperture problem for motion is dictated by whether line terminators are seen as real terminators or the result of occlusion by other surfaces, and finally, we have shown that the depth interpretation of untextured stereograms requires that the visual system edges before evaluating their depth.

DESCRIPTORS: (U) *ATTENTION, *PATTERN RECOGNITION, *VISION, *ELECTROPHYSIOLOGY, EDGES, EYE MOVEMENTS, STEREOSCOPIC DISPLAY SYSTEMS, TRANSIENTS, VISIBILITY, SPACE PERCEPTION, VISIBILITY.

IDENTIFIERS: (U) *Visual evoked potentials, Occlusion, Saccades, PE61102F, WUAFOSR2313A5.

AD-A187 942

AD-A187 937 25/5 12/9 17/4

CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL ENGINEERING

(U) Coding for Spread-Spectrum Channels in the Presence of Jamming.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 85-30 Jun 86,

JUN 86 5P

PERSONAL AUTHORS: McEliece, Robert J.

CONTRACT NO. AFOSR-83-0296

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1832

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of reliable communication in the presence of extreme and unpredictable fading was studied using the techniques of broadcast coding. It was shown that for low signal-to-noise-ratios, the sophisticated broadcast coding strategies devised by Cover and others may not be significantly superior to the much simpler class of timesharing strategies. Papers included such titles as A note on the wideband Gaussian broadcast channel and A model for the study of discrete memoryless very noisy channels.

DESCRIPTORS: (U) *CODING, *COMMUNICATION AND RADIO SYSTEMS, *JAMMING, *RELIABILITY, *TIME SHARING, RADIO BROADCASTING, STRATEGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 926 11/2

CINCINNATI UNIV OH

(U) Polymer-Modified Silica Glasses 1. Control of Sample Hardness.

87 6P

PERSONAL AUTHORS: Mark, J. E.; Sun, C.-C.

CONTRACT NO. AFOSR-83-0027, $NSF-DMR84-15082

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1936

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin, v18 p259-264 1987.

ABSTRACT: (U) The functionality of divinyl terminated poly(dimethylsiloxane) (PDMS) was greatly increased by a substitution reaction to give PDMS with triethoxysilyl chain ends. Samples were added to tetraethoxysilane (TEOS) or a related silane. The functionalized PDMS-silane mixtures were hydrolyzed in the usual sol gel technique to give polymer modified silica glasses. The hardness of the glasses was measured, and then related to the molecular weight of the PDMS, its molecular weight distribution, the composition of the PDMS-silane mixtures, and the nature of the silane. Keywords: Polymer-modified glasses; Silicate hydrolysis; Tetraethoxysilane; Hardness; Silica glasses; Siloxane polymers.

DESCRIPTORS: (U) *POLYMERS, *SILICA GLASS, DISTRIBUTION, GELS, GLASS, HARDNESS, HYDROLYSIS, MOLECULAR WEIGHT, SILANES, SILICATES, SILICON DIOXIDE, SILOXANES, SUBSTITUTION REACTIONS, MOLECULAR WEIGHT, REPRINTS.

IDENTIFIERS: (U) PDMS(Polydimethylsiloxane), PE61102F, WUAFOSR2303A3.

AD-A187 926

AD-A187 909 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Structure of Shear Flow Turbulence and Its Control.

DESCRIPTIVE NOTE: Final rept. Nov 84-May 87,

SEP 87 13P

PERSONAL AUTHORS: Haritonides, Joseph H.; Landahl, Marten T.

CONTRACT NO. F49620-83-C-0019

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1661

UNCLASSIFIED REPORT

ABSTRACT: (U) A nonlinear theory of turbulent coherent structures near walls has been developed based on the assumption that the eddies are flat, with large horizontal dimensions compared to their thickness. Turbulence in the outer part of the boundary-layer may be modelled as a linearly driven system with nonlinearities confined to the near wall region. A new model for near wall turbulence based on the concept of an instantaneous mixing length gives a mean velocity profile valid from the wall to the beginning of the log region. The effect of Large Eddy Break-up devices on the boundary layer was modelled as a wake deficit. The wake acts as a barrier to structures crossing the wake. Measurements of the skin friction behind LEBU's using a variant of the Stanton tube are in agreement with other techniques. Keywords: Turbulent boundary layer; Boundary layer control; LEBU(Large Eddy Break Up); Eddies(Fluid Mechanics), Structural properties; Boundary layer transition; Active walls; Flexible structures; Shear stresses; Drag reduction.

DESCRIPTORS: (U) *BOUNDARY LAYER CONTROL, *TURBULENCE, *TURBULENT BOUNDARY LAYER, BARRIERS, BOUNDARY LAYER, BOUNDARY LAYER TRANSITION, CROSSINGS, DEFICIENCIES, DRAG REDUCTION, FLEXIBLE STRUCTURES, FLOW, HORIZONTAL ORIENTATION, LENGTH, MEAN, MIXING, MODELS, NONLINEAR

AD-A187 909

AD-A187 909 CONTINUED

SYSTEMS, PROFILES, SHEAR PROPERTIES, SHEAR STRESSES, SKIN FRICTION, STRUCTURAL PROPERTIES, THEORY, THICKNESS, VELOCITY, WAKE, WALLS, EDDIES(FLUID MECHANICS), MATHEMATICAL MODELS.

IDENTIFIERS: (U) Shear flow, Near wall turbulence, Active walls, LEBU(Large Eddy Breakup), Large eddy breakup devices, PE61102F, WUAFOSR2307A2.

AD-A187 897 6/15 6/5

ILLINOIS UNIV AT THE MEDICAL CENTER CHICAGO COLL OF MEDICINE

(U) Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 86-15 Sep 87,

OCT 87 5P

PERSONAL AUTHORS: Radulovacki, Miodrag

CONTRACT NO. AFOSR-85-0349

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1687

UNCLASSIFIED REPORT

ABSTRACT: (U) The role of adenosine in sleep has been further investigated using electroencephalography to document the dose response effects of newly developed specific adenosine A1 and A2 receptor stimulants and 8-cyclopropyltheophylline (CPRT), a substituted xanthine. The results with adenosine agonist suggest that both A1 and A2 receptors play a role in the hypnotic action of adenosine. The data with CPRT point out that stimulant effects of xanthines is obtained by the blockade of A1 receptors. Densensitization of adenosine A2 receptors was found following the chronic treatment of adenosine agonists L-PIA, NECA ad deoxycoformycim. Chronic administration of caffeine up-regulates A1 receptors in cerebral cortex in a manner similar to that following deprivation of REM sleep. This suggests the existence of an endocaffeine whose normal role is to block adenosine receptors during prolonged sleep deprivation- a mechanism that could be responsible for the increased number of adenosine receptors. Keywords: Hypnosis; Physiological effects; Sleep deprivation.

DESCRIPTORS: (U) *ADENOSINE, *GROWTH SUBSTANCES, *HORMONES, *SLEEP DEPRIVATION, ANALOGS, CEREBRAL CORTEX, DOSAGE, ELECTROENCEPHALOGRAPHY, HYPNOSIS, HYPNOTICS AND SEDATIVES, PHYSIOLOGICAL EFFECTS, RESPONSE(BIOLOGY),

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 897 CONTINUED

SLEEP, CAFFEINE, BIOLOGICAL RHYTHMS.

IDENTIFIERS: (U) Deoxycoformycim, Xanthines, Receptor sites, Cyclopropyltheophylline, Awake.

AD-A187 896 12/3

CLEMSON UNIV SC DEPT OF MATHEMATICAL SCIENCES

(U) Generating the States of a Probabilistic System.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 28P

PERSONAL AUTHORS: Shier, D. R.; Valvo, E. J.; Jamison, R. E.

REPORT NO. TR-529

CONTRACT NO. AFOSR-84-0154

MONITOR: AFOSR
TR-87-1608

UNCLASSIFIED REPORT

ABSTRACT: (U) An important task in the evaluation of a communication or distribution system is assessing the performance of the system, when its components are subject to random failure. One approach for approximating various such performance measures is to generate a relatively small set of states of the system that covers in probability a large portion of the probabilistic system in order of nonincreasing probability. Rather interestingly, there is an elegant algebraic structure (a lattice) underlying this problem, and this structure can be exploited to produce a relatively effective algorithm for generating in order the states of the given system. In addition, the worst-case computational complexity of the algorithm is shown to be related to a certain algebraic invariant of the lattice.

DESCRIPTORS: (U) *PROBABILITY, *SYSTEMS ANALYSIS, ALGEBRA, ALGORITHMS, COMPUTATIONS, DISTRIBUTION, FAILURE, INVARIANCE.

IDENTIFIERS: (U) Lattices(Algebra).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 894 6/4

COLORADO UNIV AT BOULDER INST OF BEHAVIORAL GENETICS

(U) Behavioral Consequences of Neurotransmitter Receptor Regulation.

DESCRIPTIVE NOTE: Annual technical rept. 15 Sep 86-13 Oct 87,

OCT 87 14P

PERSONAL AUTHORS: Wehner, Jeanne M.; Collins, Allan C.

CONTRACT NO. AFOSR-85-0369

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-87-1686

UNCLASSIFIED REPORT

ABSTRACT: (U) The role of brain cholinergic receptors in regulation of physiological and behavioral function was examined by inducing a change in the number of muscarinic cholinergic receptors and studying the effects of these changes on tolerance development and spatial learning in inbred mice. Chronic treatment with oxotremorine caused a down regulation of receptors in five brain regions including hippocampus and cortex, regions thought to mediate spatial learning. The time course of receptor recovery was compared to the loss of tolerance and changes in spatial learning ability. While receptor numbers were decreased for as long as 4 days after cessation of treatment, tolerance to oxotremorine was only detected for 48 hrs after removal from chronic treatment. Like wise, impairment of spatial learning was evident when animals began training at 24 hrs after cessation of treatment but learning was normal by 48 hrs after treatment. These results indicate that the status of cortical and hippocampal cholinergic function may be important for initial behavioral effects, but that there must be other factors in addition to receptor number that are important in the regulation of physiological and behavioral function. The possible roles of other cholinergic markers and other neurotransmitter systems are currently being investigated including NMDA receptor

AD-A187 894

AD-A187 894 CONTINUED

functions and phosphorylation of hippocampal proteins.
Keywords: Learning, Brain, Nerve transmission.

DESCRIPTORS: (U) *BRAIN, *CHOLINERGIC NERVES, *NERVE TRANSMISSION, BEHAVIOR, HIPPOCAMPUS, LEARNING, LOSSES, MARKERS, MICE, NUMBERS, RECOVERY, SENSE ORGANS, SPACE PERCEPTION, TOLERANCE, PHARMACOLOGICAL ANTAGONISTS.

IDENTIFIERS: (U) Cholinergic drugs, Oxotremorine, Spatial learning, PE61102F, WUAFOSR2312A2.

AD-A187 894

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 882 12/6

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly status rept. no. 5, 1 Jun-31 Aug 87,

AUG 87 5P

PERSONAL AUTHORS: Guha, Aloke

CONTRACT NO. F49620-86-C-0082, $$ARPA Order-5794

MONITOR: AFOSR TR-87-1644

UNCLASSIFIED REPORT

ABSTRACT: (U) In this quarter, we conducted a performance evaluation of the proposed optical architecture SPARO (Symbolic Processing Architecture in Optics). Specifically, we examined the performance of the ring interconnection network of SPARO. An accurate performance model was developed for predicting the message throughout of bidirectional ring network. As suspected earlier, the ring network was the bottleneck in the performance. This led us to study other network topologies that are both feasible in optics and yield high throughput. The final choice of the optical interconnection network topology was deemed by the replicated perfect shuffle network.

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *NETWORK FLOWS, *OPTICAL PROCESSING, HIGH RATE, MODELS, NETWORKS, OPTICS, PERFORMANCE TESTS, RINGS, SYMBOLS, TOPOLOGY, YIELD, THROUGHPUT, MESSAGE PROCESSING, HIGH LEVEL LANGUAGES.

IDENTIFIERS: (U) SPARO(Symbolic Processing Architecture in Optics), Expert systems, PE61102F.

AD-A187 880 12/5

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG

(U) BIFDE: A Numerical Software Package for the Hopf Bifurcation Problem in Functional Differential Equations.

DESCRIPTIVE NOTE: Master's thesis,

JUL 86 147P

PERSONAL AUTHORS: Sathaye, Archana S.

CONTRACT NO. AFOSR-85-0071

MONITOR: AFOSR TR-87-1488

UNCLASSIFIED REPORT

ABSTRACT: (U) A software package has been written to compute the Hopf bifurcation structure in functional differential equations. The package is modular, and consists of several subroutines which perform one or more tasks. In conjunction with the routines available in this package, the user is required to provide a few routines which describe the specific system under analysis. Three example systems (from epidemology, biochemistry and aerospace engineering) have been analyzed to illustrate the use of this package. Keywords: Genetic repression; Combustion instability; Thesis; Theorems.

DESCRIPTORS: (U) *COMPUTER PROGRAM DOCUMENTATION, *MATHEMATICAL PROGRAMMING, AERONAUTICAL ENGINEERING, AEROSPACE SYSTEMS, BIOCHEMISTRY, COMPUTER PROGRAMS, DIFFERENTIAL EQUATIONS, FUNCTIONAL ANALYSIS, NUMERICAL ANALYSIS, SUBROUTINES, COMBUSTION, COMPUTATIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 871 12/1

MARYLAND UNIV BALTIMORE COUNTY CATONSVILLE DEPT OF MATHEMATICS

(U) The Optimal Convergence Rate of the p-Version of the Finite Element Method.

DESCRIPTIVE NOTE: Research rept.,

OCT 85 59P

PERSONAL AUTHORS: Babuska, I.; Suri, Manil

REPORT NO. UMBC-MRR-85-1

CONTRACT NO. AFOSR-85-0322, $NSF-DMS83-15216

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1478

UNCLASSIFIED REPORT

ABSTRACT: (U) The p-Version of the finite element method has been previously analyzed for elliptic prob ms with homogeneous boundary conditions. For a homogeneous condition of the Dirichlet type, it was shown that the exponential asymptotic convergence rate was optimal up to an arbitrarily small positive parameter epsilon. In this paper, an alternate proof is discussed which yields a better estimate by removing the dependence on epsilon. The analysis is extended to treat problems with inhomogeneous boundary conditions of both the Dirichlet and Neumann type. Estimates for a case when the solution has singularities at the corners of the domain are also provided. Keywords: Approximation(Mathematics); Polynomials.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, BOUNDARIES, CONVERGENCE, ELLIPSES, HOMOGENEITY, OPTIMIZATION, POLYNOMIALS, RATES, APPROXIMATION(MATHEMATICS).

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

AD-A187 870 21/1

TENNESSEE UNIV KNOXVILLE

(U) Conference on Maximum Principles and Eigenvalue Problems in Partial Differential Equations.

DESCRIPTIVE NOTE: Final rept. 1 Jun-30 Sep 87,

SEP 87 12P

PERSONAL AUTHORS: Schaefer, Philip W.

CONTRACT NO. AFOSR-87-0275

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-87-1685

UNCLASSIFIED REPORT

ABSTRACT: (U) New results in the extension of maximum principles to systems using best possible estimates were the high light topic. These apply to equations in continuum mechanics.

DESCRIPTORS: (U) *EIGENVALUES, *PARTIAL DIFFERENTIAL EQUATIONS, SYMPOSIA, CONTINUUM MECHANICS, ESTIMATES, INEQUALITIES.

IDENTIFIERS: (U) Elliptic equations, WUAFOSR2304A9, PE61102F.

AD-A187 871

AD-A187 870

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 868 7/2 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Novel Dialkylamino Derivatives of Phosphorus and Silicon.

DESCRIPTIVE NOTE: Final rept. 1 Jan 84-30 Sep 87,

OCT 87 22P

PERSONAL AUTHORS: King, R. B.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1691

UNCLASSIFIED REPORT

ABSTRACT: (U) Major achievements from this research project include the preparation and characterization of new types of dialkylaminophosphorus derivatives and their metal carbonyl complexes. Reductions with LiAlH4 of dialkylaminodichlorophosphines, R2NPCl2, having sufficiently large dialkylamino groups were found to lead to the corresponding dialkylaminophosphines, R2NPH2 (R2N = dicyclohexylamino and 2,2,6,6-tetramethylpiperidino) as very air-sensitive liquids. Dehalogenation of R2NPCl2 (R = isopropyl or cyclohexyl) with magnesium in tetrahydrofuran was found to give the corresponding cyclotetraphosphines (R2N)4P4; the corresponding biphosphines (iPr2N)2P2X2(X = Cl and Br) can be isolated from reactions of i(Pr2NPX2 with more limited quantities of magnesium. Keywords: Phosphorus, Silicon, Boron, Metal complexes, Dialkylamino, Cyclopolyphosphines, Metal carbonyls.

DESCRIPTORS: (U) *METAL CARBONYLS, *PHOSPHORUS, *SILICON, BORON, FURANS, HYDROXYL RADICALS, MAGNESIUM, METAL COMPLEXES, QUANTITY.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

AD-A187 868

AD-A187 862 20/6 12/6

STANFORD UNIV CA STANFORD ELECTRONICS LABS

(U) Optical Computing Research.

DESCRIPTIVE NOTE: Final rept. 30 Sep 86-30 Sep 87,

OCT 87 81P

PERSONAL AUTHORS: Goodman, Joseph W.

CONTRACT NO. AFOSR-86-0283

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-87-1635

UNCLASSIFIED REPORT

ABSTRACT: (U) Work Accomplished: OPTICAL INTERCONNECTIONS --- the powerful interconnect abilities of optical beams have led much optimism about the possible roles for optics in solving interconnect problems at various levels of computer architecture. Examined were the powerful requirements of optical interconnects at the gate-to-gate and chip-to-chip levels. OPTICAL NEUTRAL NETWORKS --- basic studies of the convergence properties on the Holfield model, based of mathematical approach - graph theory. OPTICS AND ARTIFICIAL INTELLIGENCE - review the field of optical processing and artificial intelligence, with the aim of finding areas that might be particularly attractive for future investigation(s).

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *NETWORKS, *OPTICAL CIRCUITS, *OPTICAL PROCESSING, ARTIFICIAL INTELLIGENCE, BEAMS(ELECTROMAGNETIC), CIRCUIT INTERCONNECTIONS, COMPUTATIONS, CONVERGENCE, GRAPHS, MATHEMATICS, NEUTRAL, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OPTICS, OPTIMIZATION, SKILLS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A187 862

AD-A187 860 7/4 15/3

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION INC ST CLOUD FL

(U) United States Air Force Research Initiation Program. 1984 Research Reports. Volume 4.

DESCRIPTIVE NOTE: Interim rept.,

MAY 86 998P

PERSONAL AUTHORS: Peele, Warren D.

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR TR-87-1723

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A186 490.

ABSTRACT: (U) Contents: Predicting Gaseous Phase Adsorption of Organic Vapors by Microporous Adsorbents; Solar Hard X-Ray Bursts and Type-II Radio Emissions; The Passive Mode Locking of an Nd(3+): Yag Laser With a Two-Photon Absorber; Plasma Generation and Diagnostics for Ionospheric Plasma Simulation; Study of Unified Complex Susceptibility Over Millimeter and Infrared Regions Via Kramers-Kronig Relationship; Different Career Stages: Different Degrees of Commitment; Fuse and Surface Tracking Switch Models for the Shiva Star Inductive Pulse Compression System; Modeling the Thermal Layer; Digital Interpolation Based on Functional Iteration; Numerical Characterization of Microstrip Discontinuities on Thick Substrates; Structural Modification to Enhance the Active Vibration Control of Large Space Structures; Consistent Shear Lag Modeling of Damage in Unidirectional Composite Laminates; Numerical Simulation of a Supersonic Inlet Flow; Reconfiguration of Flight Control System of Unmanned Research Vehicle; Analysis of Armor Bracketry; Development and Implementation of Cost-Effectiveness and Utility Methodologies for the AF Performance Measurement Project; A Scanning Electron Microscopical Study of Periosteum from Subhuman Primates; Liquid Rocket

Instability Model Development.

DESCRIPTORS: (U) *FLIGHT CONTROL SYSTEMS, *IONOSPHERIC MODELS, *MATHEMATICAL MODELS, *MICROSCOPY, *NUMERICAL ANALYSIS, *PLASMAS(PHYSICS), *SPACECRAFT, *SUPERSONIC FLOW, ADSORBENTS, ADSORPTION, ARMOR, COMPOSITE MATERIALS, CONSISTENCY, CONTROL, DELAY, DIGITAL SYSTEMS, DISCONTINUITIES, ELECTRONIC SCANNERS, GASES, INFRARED RADIATION, INTERPOLATION, ITERATIONS, LAMINATES, LAYERS, MEASUREMENT, METHODOLOGY, MODELS, MODIFICATION, PASSIVE SYSTEMS, PLASMA GENERATORS, POROUS MATERIALS, SHEAR PROPERTIES, STRIP TRANSMISSION LINES, STRUCTURAL PROPERTIES, SUBSTRATES, SUPERSONIC INLETS, SURFACES, SWITCHES, THERMAL PROPERTIES, THICKNESS, TRACKING, UNIDIRECTIONAL, UNMANNED, VAPORS, VEHICLES, VIBRATION, YAG LASERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301D5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 859 7/2 7/3 7/4 9/3
9/1

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION INC ST CLOUD FL

(U) United States Air Force Research Initiation Program. 1984 Research Reports. Volume 3.

DESCRIPTIVE NOTE: Interim rept.,

MAY 86 896P

PERSONAL AUTHORS: Peele, Warren D.

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-87-1722

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 4, AD-A187 860.

ABSTRACT: (U) Contents: Aryloxy Substituted Pyromellitic Dianhydrides; Angle Resolved Ion Scattering Study of GaAs Surfaces the Experiment Design; Thermal Decomposition Studies of Some Silahydrocarbons; Silane-Treated Silica Fillers for Use in Fulrosilicone Elastomers; Raman Spectroscopic Studies in Extrinsic P-Type Silicon; Grain Size Control in Meta Stable Beta Titanium Alloys; The Impact of Expert Systems on Performance and Cognitive Strategies in Diagnostic Inference; Effects of Enriching a Computer-Instructed Proceduralized Task with Explanatory Information; Specification Searches in Covariance Structure Modeling; A Computational Model of the Human Cardiopulmonary System; Development of an Optimal Testing Protocol for the USAF Criterion Task Set; Construction of Concept Atoms; Development of a High Frequency Lung Ventilation Model for Testing Under Hypobaric Conditions; Brillouin Spectroscopy in Systems of Biological Significance; Stabilization of Mode Locked Lasers; Raman Spectroscopy of Carotenoids and Other Molecules in Unstimulated and Stimulated, Cultured Y 1 Mouse Adrenal Tumor Cells; Military Family Stress and Job Performance; Evaluation and Validation of ADA Programming Support Environments; Kinetics fo Homogeneous Gas Phase Oxidation of Hydrazine in Air; and Software Corrections and Extensions for an Integrated Particle Sizing System.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *MATHEMATICAL MODELS, *MODE LOCKED LASERS, *P TYPE SEMICONDUCTORS, *PARTICLE SIZE, *SILICON, *SPECTROSCOPY, ATOMS, BRILLOUIN ZONES, CAROTENOIDS, COGNITION, COMPUTATIONS, COMPUTER PROGRAMMING, COMPUTER PROGRAMS, CONSTRUCTION, CONTROL, CORRECTIONS, COVARIANCE, ELASTOMERS, FAMILIES(HUMAN), FAMILY MEMBERS, GRAIN SIZE, HEART, HOMOGENEITY, HUMANS, HYDRAZINES, HYPOBARIC CONDITIONS, INTEGRATED SYSTEMS, IONS, JOBS, LUNG, MODELS, MOLECULES, OPTIMIZATION, OXIDATION, PERFORMANCE(HUMAN), RAMAN SPECTROSCOPY, SCATTERING, STRATEGY, STRESSES, SURFACES, TEST AND EVALUATION, VALIDATION, VAPOR PHASES.

IDENTIFIERS: (U) WUAFOSR2301D5, PE61102F.

AD-A187 818 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Deterministic Equivalent for a Continuous Linear-Convex Stochastic Control Problem.

DESCRIPTIVE NOTE: Technical rept.,

SEP 87 18P

PERSONAL AUTHORS: Sethi, S.; Taksar, M. I.

CONTRACT NO. AFOSR-87-0278, $NSF-DMS86-01510

PROJECT NO. 2304

MONITOR: AFOSR TR-87-1480

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors consider a finite horizon control model with additive input. There are two convex functions which describe the running and the terminal costs within the system. The cost of input is proportional to input and can take both positive and negative values. It is shown that there exists a deterministic control problem whose optimal cost is the same as the one in the stochastic control problem. The optimal policy in the stochastic problem consists of keeping the process as close to the optimal deterministic trajectory as possible. Keywords: Stochastic linear systems; Additive noise; Optimization.

DESCRIPTORS: (U) *LINEAR SYSTEMS, *STOCHASTIC CONTROL, *MATHEMATICAL MODELS, COSTS, DETERMINANTS(MATHEMATICS), DETERMINATION, FUNCTIONS(MATHEMATICS), HORIZON, INPUT, OPTIMIZATION, POLICIES, TRAJECTORIES.

IDENTIFIERS: (U) PE61102F.

AD-A187 818

AD-A187 817 20/11 12/1

BOSTON UNIV MA COLL OF ENGINEERING

(U) Parametric Dependence in the Equilibrium Dynamics of Rotating Structures.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 86-14 Apr 87,

JUN 87 11P

PERSONAL AUTHORS: Baillieul, John

CONTRACT NO. AFOSR-85-0144

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1487

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes work done by the author during the past twelve months on the dynamics of complex rotating systems. Our recent work on the mechanics of rotating elastic structures shows a complex dependency of asymptotic equilibrium states on physical parameters such as elasticity of the material and total momentum of the structure. For multiply articulated rigid bodies undergoing large angle rotations, it is shown explicitly how there can be a sensitive dependence of equilibrium states on parameters of inertia and angular momentum. This suggests that recent work on geometrically nonlinear beam theories may be significant not only for transient analysis, but for accurately modeling asymptotic dynamics as well. Keywords: Classical mechanics, Beam theories, Equilibrium dynamics, Kinematic chains.

DESCRIPTORS: (U) *ANGLES, *ROTATION, ANGULAR MOMENTUM, CHAINS, DYNAMICS, ELASTIC PROPERTIES, EQUILIBRIUM(GENERAL), GEOMETRIC FORMS, INERTIA, KINEMATICS, MOMENTUM, NONLINEAR SYSTEMS, PARAMETRIC ANALYSIS, PHYSICAL PROPERTIES, RIGIDITY, SENSITIVITY, STRUCTURES, THEORY, TRANSIENTS, BEAMS(STRUCTURAL), CANTILEVER BEAMS, MECHANICS, STABILITY, DEFLECTION, STRUCTURAL RESPONSE.

IDENTIFIERS: (U) Rotating structures, Articulated

AD-A187 817

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 817 CONTINUED

structures, Kinematic chains, Equilibrium dynamics.

AD-A187 805 12/1

TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF MATHEMATICS

(U) Equivalence Constants for L sub p Norms of Matrices,

87 8P

PERSONAL AUTHORS: Goldberg, Moshe

CONTRACT NO. AFOSR-83-0150

MONITOR: AFOSR
TR-87-1543

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear and Multilinear Algebra, v21 p173-179 1987.

ABSTRACT: (U) The l sub p norm and the l sup p operator-norm of an m x n complex matrix A = alpha sub ij are given by: abs. val A sub p = (Sum over ij of abs. val of alpha sub ij to the pth power); and normalized value of A sub p = max (abs. val Ax sub p: x an element of C to the nth power, abs. val x sub p = 1) respectively. The purpose of this paper is to study the equivalence relations between these norms.

DESCRIPTORS: (U) *CONSTANTS, *MATRICES(MATHEMATICS), REPRINTS, OPERATORS(MATHEMATICS).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 789 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Volumes of Activation for the Cycloaddition Reactions of Phenylhalocarbenes to Alkenes.

87 5P

PERSONAL AUTHORS: Turro, Nicholas J.; Okamoto, Masami; Gould, Ian R.; Moss, Robert A.; Lawrynowicz, Witold

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1472

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v109 n 16 p4973-4976 1987.

ABSTRACT: (U) The absolute rate constants for the cycloaddition reactions of three arylhalocarbenes to two alkenes have been measured as a function of pressure in the range 0.1 to 203 MPz. In all cases the observed rate constants were found to increase with increasing pressure. The magnitude of the derived activation volumes falls in the range of -10 to -18 cc/mol and does not depend on solvent. The results rule out a late, two-bond transition state and a bipolar single-bond transition state, but are consistent with the reversible formation of a carbenealkene complex or an early one- or two-bond transition state. Keywords: Cycloaddition Reactions; Alkenes; Phenylhalocarbenes; Pressure effects; Laser flash photolysis.

DESCRIPTORS: (U) *CYCLIC COMPOUNDS, *ALKENES, *PHENYL RADICALS, *CARBENES, CONSTANTS, RATES, PRESSURE, REVERSIBLE, ACTIVATION, VOLUME, FLASHES, LASERS, PHOTOLYSIS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A187 789

AD-A187 788 12/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) A Multistage Reduction Technique for Feedback Stabilizing Distributed Time-Lag Systems.

87 17P

PERSONAL AUTHORS: Fiagbedzi, Y. A.; Pearson, A. E.

CONTRACT NO. AFOSR-85-0300, $NSF-ECS85-05799

MONITOR: AFOSR TR-87-1483

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v23 n3 p311-326 1987.

ABSTRACT: (U) A direct pole relocation theory is advanced for linear time-invariant systems with distributed delays in both state and control variables. The principal tools of the theory include 1) the finite cardinality of the unstable spectrum; 2) a set of matrices, each of which is left zero of the system characteristic quasi-polynomial matrix; and 3) a linear transformation which reduces the delay system to a sufficiently high-order delay-free system whose spectrum contains the delay system unstable spectrum. It is shown that if the system is spectrally stabilizable, then it shares a common feedback stabilizing control law with its delay-free counterpart. This point of contact with a delay-free system permits the determination of the control law using well-established ordinary system methods. The workability of the approach hinges on the ability to partition the unstable spectrum (augmented with additional poles from the stable spectrum, if necessary) into N symmetric sets. When this partition is impossible, a spectral controllability invariance theorem facilitates resolution of the problem. Keywords: Reprints; Matrix equations.

DESCRIPTORS: (U) *LINEAR SYSTEMS, *TIME LAG THEORY, CONTROL, CONTROL THEORY, DELAY, INVARIANCE, REDUCTION, REPRINTS, RESOLUTION, SPECTRA, STABILITY, STAGING, SYMMETRY, THEOREMS, THEORY, TIME, TOOLS, TRANSFORMATIONS(MATHEMATICS), VARIABLES, FEEDBACK.

AD-A187 788

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 787 12/4

LOYOLA UNIV OF CHICAGO IL DEPT OF MATHEMATICAL SCIENCES

(U) The Pontryagin Maximum Principle from Dynamic Programming and Viscosity Solutions to First-Order Partial Differential Equations,

DEC 86 8P

PERSONAL AUTHORS: Barron, Emmanuel N.; Jensen, Robert

CONTRACT NO. AFOSR-86-0202

MONITOR: AFOSR TR-87-1485

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Transactions of the American Mathematical Society, v298 n2 p635-641 Dec 86.

ABSTRACT: (U) The Pontryagin Maximum Principle is proved for the Lagrange problem of optimal control using the fact that the value function of the problem is the viscosity solution of the associated Hamilton-Jacobi-Bellman equation. The proof here makes rigorous the formal proof of Pontryagin's principle known for at least three decades.

DESCRIPTORS: (U) *DYNAMIC PROGRAMMING, *CONTROL THEORY, CONTROL, LAGRANGIAN FUNCTIONS, OPTIMIZATION, PARTIAL DIFFERENTIAL EQUATIONS, REPRINTS, SOLUTIONS(GENERAL), VISCOSITY.

IDENTIFIERS: (U) Pontryagin Maximum Principle.

AD-A187 787

AD-A187 786 1/1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF MATHEMATICS

(U) Well-Posedness of Functional Differential Equations with Nonatomic D Operators,

85 8P

PERSONAL AUTHORS: Burns, John A.; Herdman, Terry L.; Turi, Janos

CONTRACT NO. AFOSR-84-0326, $NSF-ECS81-09245

MONITOR: AFOSR TR-87-1613

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Trends in the Theory and Practice of Non-Linear Analysis, p71-77 1985.

ABSTRACT: (U) This paper considers the question of well-posedness for a functional differential equation (FDE) that has been used to mathematically model the elastic motions of a two-dimensional airfoil in unsteady flows. This equation is a neutral functional differential equation (NFDE) for which the D operator is not atomic at s=0. Equations of this type also occur in the theory of lossless transmission lines and include many singular integrodifferential equations. It is often advantageous to have a state space model for these systems when addressing certain numerical and control problems. Section 2 presents a brief summary of recent results concerning necessary and sufficient conditions for neutral equations to be well posed in product spaces. Section 3 considers the well-posedness question for the aeroelastic model and close with a discussion of more general equations. Keywords: Reprints, Aeroelasticity.

DESCRIPTORS: (U) *AEROELASTICITY, *UNSTEADY FLOW, CONTROL, DIFFERENTIAL EQUATIONS, ELASTIC PROPERTIES, FUNCTIONAL ANALYSIS, INTEGRAL EQUATIONS, LOSSES, MATHEMATICAL MODELS, MOTION, NEUTRAL, NUMERICAL ANALYSIS, REPRINTS, TRANSMISSION LINES, TWO DIMENSIONAL, CONTROL THEORY, BANACH SPACE.

IDENTIFIERS: (U) Functional differential equations, Lebesque measure.

AD-A187 786

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 785 12/1

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) Remarks on Multigrid Convergence Theorems,

87 19P

PERSONAL AUTHORS: Parter, Seymour V.

CONTRACT NO. AFOSR-82-0275, $AFOSR-86-0163

MONITOR: AFOSR
TR-87-1492

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Mathematics and Computation, v23 p103-120 1987.

ABSTRACT: (U) Multigrid has become an important method for the solution of discrete elliptic equations. However, there is much to be done in the theory of convergence proofs. At the present time there are two general two-level methods for general convergence proofs: an algebraic approach and a duality approach. While these theories do not give sharp estimates, they provide good, general, rigorous convergence theorems. This note studies the relationship between these theories. While the approach and thought process leading to these theories are different, the results are essentially the same. Indeed, the basic estimates required by these theories are the same. Keywords: Reprints; Convergence.

DESCRIPTORS: (U) *CONVERGENCE, *ITERATIONS, ALGEBRA, ELLIPSES, EQUATIONS, ESTIMATES, REPRINTS, THEOREMS, THEORY.

IDENTIFIERS: (U) Discrete elliptic equations.

AD-A187 784 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Additive Effects on the CIDNP, Cage Effect, and Exit Rate of Micellized Radical Pairs,

87 6P

PERSONAL AUTHORS: Turro, N. J.; Zimmt, M. B.; Lei, X. G.; Gould, I. R.; Nitsche, K. S.

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1494

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 n17 p4544-4548 1987.

ABSTRACT: (U) The effects of additives on the recombination efficiency and exit rates of micellized benzyl radicals have been studied by steady-state CIDNP, steady-state product analysis, and time-resolved optical absorption techniques. The results indicate that the efficiency of triplet geminate pair recombination increases monotonically as the micellar volume increases. Aggregation numbers of SDS micelles were deduced as a function of additive concentration from CIDNP measurements and were found to be consistent with literature values. Keywords: Time resolved absorption; micelles.

DESCRIPTORS: (U) *ATOMS, *CLUSTERING, *LITHIUM, *BERYLLIUM, ADDITIVES, ANGLES, BONDING, ELECTRONICS, EQUILIBRIUM(GENERAL), EXCHANGE, EXITS, FRAGMENTATION, GROUND STATE, HARTREE FOCK APPROXIMATION, INTERACTIONS, IONIZATION, LENGTH, MAGNESIUM, MASS SPECTRA, METALS, NEUTRAL, RATES, REPRINTS, RHOMBUS, SPINNING(MOTION), STRUCTURES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 771 4/1 7/2

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) Gas-Phase Photoelectron Spectroscopy of Metals and Metal Oxides of Importance in the Upper Atmosphere.

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-31 Aug 87,

OCT 87

PERSONAL AUTHORS: Dyke, J. M.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1634

UNCLASSIFIED REPORT

ABSTRACT: (U) Photoelectron spectroscopy is used to study in the gas phase the electronic structure of metals and metal oxides which are of importance in the upper atmosphere. Ionization energies and cross-sections at discrete wavelengths are obtained. Exothermicities of charge exchange reactions of metal oxides and dioxides of importance to atmospheric modelling calculations will be determined. Keywords: Photoelectron spectroscopy, Ionization energies, Ionic heats of formation, Charge exchange reactions.

DESCRIPTORS: (U) *METAL COMPOUNDS, *METALS, *OXIDES, *VAPOR PHASES, ATMOSPHERE MODELS, CHARGE TRANSFER, DIOXIDES, ELECTRONICS, ENERGY, EXCHANGE REACTIONS, IONIZATION, PHOTOELECTRON SPECTRA, UPPER ATMOSPHERE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A187 762 7/4 20/2

SCHWARTZ ELECTRO-OPTICS INC CONCORD MA BOSTON DIV

(U) Characterization of Er,Cr:YSGG.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 86,

JUN 87 36P

PERSONAL AUTHORS: Moulton, Peter F.

CONTRACT NO. F49620-86-C-0074

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-87-1486

UNCLASSIFIED REPORT

ABSTRACT: (U) A study of the spectroscopic and laser properties of the crystal erbium-and chromium-doped yttrium scandium gallium garnet (Er,Cr:YSGG) has been carried out. The absorption spectra from 300-1700 nm and the emission spectra in the regions around 800, 1600 and 2800 nm have been measured, along with the kinetics of emission and decay under pulsed excitation. Energy levels of the erbium ion have been determined. Analysis of the data shows that energy transfers from excited chromium ions to erbium ions with near-100% efficiency. The 2800-nm-region laser performance of Er,Cr:YSGG, under flashlamp pumping conditions has been observed and found to be superior in some aspects to other erbium doped crystals.

DESCRIPTORS: (U) *CHROMIUM, *DOPING, *EMISSION SPECTRA, *ERBIUM, *GALLIUM, *GARNET, ABSORPTION SPECTRA, CRYSTALS, EMISSION, ENERGY LEVELS, EXCITATION, FLASH LAMPS, IONS, KINETICS, LASERS, PULSES, PUMPING, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A187 771

AD-A187 762

AD-A187 761 21/2

COLORADO UNIV AT BOULDER DEPT OF MECHANICAL ENGINEERING

(U) Combustion Spectroscopy by Pumped Dye Laser.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Jun 85,

NOV 86 18P

PERSONAL AUTHORS: Branch, Melvyn C.

CONTRACT NO. AFOSR-84-0193

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-87-1427

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes a pumped dye laser system used in studies of the combustion of nitramine based solid rocket propellants. Although these propellants have advantages of high specific impulse and low infrared and smoke emissions from their exhaust, better control of the burn rate is needed. Propellant additives have been suggested for burn rate control but the understanding of the chemical mechanism of burning is not well enough developed to predict the effects of these burn rate modifiers. The objective of our studies is to describe the detailed chemistry of reactions of gas phase species which are important in the combustion of nitramine propellants and additives. Species composition, temperature and burning rate have been measured for reacting gas mixtures representative of the pyrolysis products of nitramines and nitramines with additives. Chemical kinetic and fluid mechanic modeling of the flame structure is used to correlate the experimental data and evaluate critical reaction paths and energetics and their importance in burn rate control.

DESCRIPTORS: (U) *BURNING RATE, *COMBUSTION, *DYE LASERS, *SPECTROSCOPY, ADDITIVES, CHEMICAL REACTIONS, CHEMICALS, CHEMISTRY, CONTROL, CRITICAL PATH METHODS, EMISSION, ENERGETIC PROPERTIES, EXPERIMENTAL DATA, FLAMES, FLUIDS, FUEL ADDITIVES, GASES, INFRARED RADIATION, LASER PUMPING, MIXTURES, MODIFICATION, NITRAMINES, PROPELLANTS,

AD-A187 761 CONTINUED

PYROLYSIS, REACTION KINETICS, RESPONSE, SMOKE, SPECIFIC IMPULSE, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 760 21/2

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD

(U) Chemically Reacting Turbulent Flow.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Sep 85,

DEC 85 39P

PERSONAL AUTHORS: Pitts, William M.; Kashiwagi, Takashi

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-87-1425

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results on chemically reacting turbulent flow. The development of new diagnostics for variable density flows are described. These include Rayleigh light scattering for real-time, spatially-resolved concentration measurements, combined Rayleigh light scattering and hot wire anemometry for simultaneous concentration and velocity measurements, and the development of a digital line camera which has allowed the concentration measurement to be made along a line. A study of heat transfer from heated cylinders is discussed which has generated a much improved correlation of experimental results. Shadowgraph visualization studies and centerline concentration measurements are described for variable density, axisymmetric turbulent jets covering jet to coflow density ratios of 0.14 to 37. These studies have also included a limited investigation of Reynolds number effects. The observed dependence of the mixing behavior on the density ratio and Re have led us to make new hypotheses are shown to lead to qualitative predictions for the turbulent mixing which are in agreement with experimental findings.

DESCRIPTORS: (U) *HOT WIRE ANEMOMETERS, *LIGHT SCATTERING, *RAYLEIGH SCATTERING, *TURBULENT FLOW, BEHAVIOR, CAMERAS, CORRELATION, CYLINDRICAL BODIES, DENSITY, DIAGNOSIS(GENERAL), DIGITAL SYSTEMS, FLOW, HEAT, HEAT TRANSFER, HYPOTHESES, JET FLOW, MEASUREMENT, MIXING, PREDICTIONS, RATIOS, REYNOLDS NUMBER, SPARK SHADOWGRAPH PHOTOGRAPHY, VARIABLES, VELOCITY.

AD-A187 760

AD-A187 760 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A187 760

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 759 6/4 5/8

MICHIGAN UNIV ANN ARBOR DEPT OF PHYSIOLOGY

(U) Modulation of Thalamic Somatosensory Neurons by Arousal and At[illegible]ion.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 86-31 Jul 87,

AUG 87 10P

PERSONAL AUTHORS: Morrow, Thomas J.

CONTRACT NO. AFOSR-85-0286

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-87-1413

UNCLASSIFIED REPORT

ABSTRACT: (U) Several directions have been followed toward the attainment of our research goals. We have continued recording in the untrained monkey, looking at arousal related changes in spontaneous and evoked thalamic activity, as well as, the effects of various drugs on these responses. We are now recording the responses of thalamic somatosensory neurons in behaviorally trained animals, looking at response modulation during two attentional paradigms, including shifts in arousal. Preliminary experiments have been conducted to develop methods for examining the underlying mechanisms of thalamic modulation. We are continuing to update and validate our computerized stereotaxic atlas of the green monkey brain. We have also developed a unique computer program for the acquisition (PETH) and statistical analysis (HISTSAT) of perievent time histograms. Some of the results in this report have been or will be communicated at scientific meetings, published or are in press. Keywords: Nerve transmission, Cerebral cortex.

DESCRIPTORS: (U) *NERVE TRANSMISSION, *NERVE CELLS, *THALAMUS, ACQUISITION, BRAIN, CEREBRAL CORTEX, COMPUTER PROGRAMS, DRUGS, HISTOGRAMS, MODELS, MODULATION, MONKEYS, STATISTICAL ANALYSIS, TIME, TRAINING, STIMULATION(PHYSIOLOGY), ATTENTION.

AD-A187 759 CONTINUED

IDENTIFIERS: (U) Arousal, African Green monkeys, PE61102F, WUAFOSR2312A2.

AD-A187 759

DTIC REPORT BIBLIOGRAPHY

AD-A187 758 21/2 14/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK

(U) Turbulent Premixed Reacting Flows.

DESCRIPTIVE NOTE: Final rept. 15 Dec 84-14 Dec 85,

APR 86 6P

PERSONAL AUTHORS: Santavicca, D. A.

CONTRACT NO. DAAG29-85-K-0043, $AFOSR-85-0088

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR
TR-87-1429

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant AFOSR-84-0224.

ABSTRACT: (U) Instrumentation has been acquired and made operational for use in a study of the interaction of turbulence and combustion in premixed turbulent flames. This includes a laser Doppler anemometer for single point, two point and two component velocity measurements, a two-dimensional laser flow visualization system and a related data acquisition and processing microcomputer system. Keywords: Premixed turbulent combustion, Laser doppler velocimetry, Flames.

DESCRIPTORS: (U) *FLAMES, COMBUSTION, DATA ACQUISITION, DOPPLER SYSTEMS, LASER ANEMOMETERS, LASER VELOCIMETERS, MEASUREMENT, MICROCOMPUTERS, MIXING, PROCESSING, TURBULENCE, VELOCITY, TURBULENT FLOW, REACTION KINETICS.

IDENTIFIERS: (U) Turbulent reacting flow, PE61102F, WUAFOSR2917A1.

AD-A187 758

SEARCH CONTROL NO. EVJ50D

AD-A187 757 12/9 12/1

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Stability Enhancement of Flexible Structures by Nonlinear Boundary-Feedback Control,

JUN 86 22P

PERSONAL AUTHORS: Balakrishnan, A. V.

CONTRACT NO. AFOSR-83-0318

PROJECT NO. 9769

TASK NO. 01

MONITOR: AFOSR
TR-87-1493

UNCLASSIFIED REPORT

ABSTRACT: (U) Strong stability for a class of nonlinear boundary feedback controllers using an abstract wave equation formulation of a beam stabilization problem arising in the control of flexible structures in space.

DESCRIPTORS: (U) *SPACE SYSTEMS, CONTROL SYSTEMS, FLEXIBLE STRUCTURES, FORMULAS(MATHEMATICS), OPTIMIZATION, STABILITY, STABILIZATION SYSTEMS, WAVE EQUATIONS, CONTROL THEORY, BEAMS(STRUCTURAL), FEEDBACK, DIFFERENTIAL EQUATIONS, BOUNDARIES, NONLINEAR SYSTEMS.

IDENTIFIERS: (U) Space structures, Boundary control, Nonlinear control systems, PE61102F, WUAFOSR976901.

AD-A187 757

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 742 20/5 20/10

OREGON UNIV EUGENE

(U) Theory of Two-Photon Emission from Atomic Inner Shells.

DESCRIPTIVE NOTE: Rept. for 15 Jan 87-14 Jan 88,

JUL 87

PERSONAL AUTHORS: Guo, Dong-Sheng

CONTRACT NO. AFOSR-87-0026

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-87-1424

UNCLASSIFIED REPORT

ABSTRACT: (U) From quantum electrodynamics it is proved that two photon emission in transitions between atomic inner shells can be treated in lowest order approximation in the single particle model. By taking many body effects into account to show that, in the reduced single-particle model, the Pauli exclusion principle does not prohibit summing over all possible intermediate states, including core states. Some transition rate formulas are presented that are useful for numerical calculations.

DESCRIPTORS: (U) *QUANTUM ELECTRODYNAMICS, *EMISSION SPECTRA, *ATOMIC SPECTROSCOPY, COMPUTATIONS, NUMERICAL ANALYSIS, PARTICLES, PHOTONS, THEORY, MATHEMATICAL MODELS.

IDENTIFIERS: (U) *Two photon emission, Pauli exculsion principle, PE61102F, WUAFOSR2301A4.

AD-A187 742

AD-A187 697 5/8

MASSACHUSETTS UNIV AMHERST DEPT OF COMPUTER AND INFORMATION SCIENCE

(U) Two Attentional Models of Classical Conditioning: Variations in CS Effectiveness Revisited.

DESCRIPTIVE NOTE: Technical rept.,

APR 87 35P

PERSONAL AUTHORS: Schmajuk, Nestor A.; Moore, John W.

REPORT NO. COINS-TR-87-29

CONTRACT NO. AFOSR-86-0182

MONITOR: AFOSR
TR-87-1681

UNCLASSIFIED REPORT

ABSTRACT: (U) Attentional models offer alternatives for describing blocking, overshadowing, and many other features of classical conditioning. Two such models emphasize variations in the associability of CSs instead of variation in the effectiveness of the reinforcing event, the US. Early published variants do not always accurately portray the effects of nonreinforced CS presentations as represented in simulation experiments. In one case levels of conditioned responding under partial reinforcement are too low to reasonably approximate expectations based on the experimental literature, and extinction is too deep to produce the rapid reacquisition that typically follows extinction. These problems are corrected by changing the expressions in the model for decreasing associative strength. The revised model retains the positive features of the original, e.g., the ability to stimulate in real-time latent inhibition and compound CS effects such as blocking and conditioned inhibition. The other model is path dependent and highly nonlinear under partial reinforcement. The problem can be corrected either by modifying and restricting the rules for computing the associability of the CS, or by modifying the rules for computing associative strength. The revised model retains the original's ability to simulate latent inhibition, compound CS effects, and the transfer (positive or negative) from training with a weak US to training with

AD-A187 697

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 697 CONTINUED

stronger US. Keywords: Conditioned stimulus, Unconditioned stimulus.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, DORMANCY, EXTINCTION, INHIBITION, REAL TIME, SIMULATION, STIMULI, VARIATIONS, CONDITIONING(LEARNING).

IDENTIFIERS: (U) Conditioned stimulis, PE61102F.

AD-A187 697

AD-A187 688 21/2

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Fuels Combustion Research.

DESCRIPTIVE NOTE: Annual rept. 10 Oct 86-30 Sep 87,

OCT 87 38P

PERSONAL AUTHORS: Dryer, Frederick L.; Glassman, Irvin; Williams, Forman A.

CONTRACT NO. F49620-86-C-0006

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1901

UNCLASSIFIED REPORT

ABSTRACT: (U) After studying soot formation in normal diffusion flames, near and slightly sooting inverse diffusion flames were investigated to determine the key intermediates to soot formation. The results indirectly confirm that the initial number density of soot particles which form scale with aromatic formation just prior to soot inception. Correlations exist between a fuel's sooting tendency as measured by the Princeton smoke height experiment and the extent of aromatic formation measured in both inverse and normal diffusion flames. Work on the oxidation of the aromatics present in jet propulsion fuels continues with th major effort directed at the dialkylated benzenes. The major study concerned the oxidation of para-xylene. The results indicate oxidation of one side chain at a time before the benzene ring is attached. There is a linear decay of the fuel and the major species detected were toluene, benzene, p-tolualdehyde, p-ethyltoluene and carbon monoxide. Kinetics steps leading to these intermediates are given. Combustion property observations of isolated boron slurry droplets were extended to in-house boron/JP-10 slurries with and without surfactants. The experimental results revealed that stabilizing agents are responsible fo rthe violent disruption of the primary slurry droplet and strongly support the previously proposed hypothesis of

AD-A187 688

AD-A187 688 CONTINUED

the formation of the impermeable shell and subsequent disruption phenomena. Keywords: Born slurry combustion; Boron cloud combustion; Slurry fuels; Jet engine fuels.

DESCRIPTORS: (U) *BORON, *COMBUSTION, *FUELS, AROMATIC COMPOUNDS, BENZENE, CARBON MONOXIDE, CHAINS, CLOUDS, DECAY, DENSITY, DIFFUSION, DROPS, FLAMES, HEIGHT, HYPOTHESES, INVERSION, ISOLATION, JET ENGINE FUELS, JET PROPULSION, OXIDATION, PARTICLES, PERMEABILITY, RINGS, SHELLS(STRUCTURAL FORMS), SLURRIES, SLURRY FUELS, SMOKE, SOOT, STABILIZATION, SURFACE ACTIVE SUBSTANCES, TOLUENES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2

AD-A187 687 4/1 20/14

UTAH STATE UNIV LOGAN CENTER FOR ATMOSPHERIC AND SPACE SCIENCES

(U) USU (Utah State University) Center of Excellence in Theory and Analysis of the Geo-Plasma Environment.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

OCT 87

PERSONAL AUTHORS: Schunk, Robert W.

CONTRACT NO. F49620-86-C-0109

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR TR-87-1900

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of the research is to obtain a better understanding of the basic chemical and physical processes operating in the geoplasma environment, including the ionosphere, thermosphere, and magnetosphere. Some of the specific tasks include the following: (1) Studies of ionospheric structure and irregularities; (2) Study the feasibility of developing better operational ionospheric models for the Air Force; (3) Conduct model/data comparisons in order to validate the ionospheric models; (4) Study plasma convection characteristics in the high-latitude ionosphere; (5) Study magnetosphere-ionosphere coupling problems; (6) Construct a thermospheric general circulation model; (7) Develop a 3D, time-dependent model of the outer plasmasphere; (8) Develop a 3D, time-dependent MHD model of the earth's magnetosphere; (9) Conduct satellite drag studies; and (10) Study certain spacecraft-environment interaction problems, including those related to high-voltage power sources, spacecraft outgassing, and spacecraft charging at LEO altitudes.

DESCRIPTORS: (U) *IONOSPHERE, *MAGNETOSPHERE, *PLASMASPHERE, *PLASMAS(PHYSICS), *THERMOSPHERE, *ELECTROMAGNETIC WAVE PROPAGATION, ARTIFICIAL SATELLITES, CIRCULATION, CONVECTION, DRAG, EARTH(PLANET), ELECTRIC

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 687 CONTINUED

CHARGE, EXTERNAL, HIGH LATITUDES, HIGH VOLTAGE, INTERACTIONS, IONOSPHERIC MODELS, MAGNETOHYDRODYNAMICS, POWER SUPPLIES, SOURCES, SPACE ENVIRONMENTS, SPACECRAFT, TIME DEPENDENCE, IONOSPHERIC DISTURBANCES, THREE DIMENSIONAL, RADAR SIGNALS, RADIO SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A2.

AD-A187 668 6/4 5/8

SRI INTERNATIONAL MENLO PARK CA SENSORY SCIENCES RESEARCH LAB

(U) Spatiotemporal Characteristics of Visual Localization. Phase 2.

DESCRIPTIVE NOTE: Annual rept. Oct 86-Oct 87,

SEP 87 126P

PERSONAL AUTHORS: Burbeck, Christina A.

CONTRACT NO. F49620-85-K-0022

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-87-1637

UNCLASSIFIED REPORT

ABSTRACT: (U) The spatial and temporal characteristics of human visual localization are studied using psychophysical techniques. The primary tasks studied are frequency discrimination and distance judgments in the plane perpendicular o the observer's line of sight. It is found that these tasks cannot be performed directly on the basis of simple transformations of the retinal image, but depend on stimulus context and on judgment of stimulus depth. Experiments are designed to isolate the process underlying these distance and size judgments from more distal visual processes. One prominent finding is that the localization process is remarkably insensitive to those aspects of the stimulus that most affect contrast detection thresholds. Keywords: Human vision; Visual psychophysics; Visual spatial localization.

DESCRIPTORS: (U) *DISCRIMINATION, *VISION, *VISUAL PERCEPTION, CONTRAST, DEPTH, DETECTION, FREQUENCY, HUMANS, IMAGES, JUDGEMENT(PSYCHOLOGY), LINE OF SIGHT, OBSERVERS, PSYCHOPHYSICS, RETINA, STIMULI, THRESHOLD EFFECTS, TRANSFORMATIONS, MOVING TARGETS, LINE OF SIGHT.

IDENTIFIERS: (U) *Spatiotemporal characteristics, Depth perception, WUAFOSR2313A5, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 662 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Synthesis and Molecular Structure of a Disilacyclopropanimine.

87 3P

PERSONAL AUTHORS: Yokelson, Howard B.; Millevolte, Anthony J.; Haller, Kenneth J.; West, Robert

CONTRACT NO. F49620-86-C-0010, $NSF-CHE83-18810

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1821

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Chemical Communications, v21 p1605-1606 1987.

ABSTRACT: (U) The reactions of disilenes lead to many new classes of silicon compounds, including several three and four membered rings which present novel problems in chemical bonding. We report here the reaction of a disilene with an isonitrile to form the first disilacyclopropanimine. The addition of the colourless 2, 6-dimethylphenyliso-cyanide (57 mg) to a yellow solution of tetra(2,6-dimethyl-phenyl)disilene (200 mg) in 2 ml of benzene at room temperature, resulted in an immediate colour change to deep red. Upon standing, crystals (1) suitable for X-ray crystallographic analysis were obtained from this reaction mixture (Scheme 1). The compound decolourizes slowly, both in solution and in the solid state, on exposure to air. The reaction leading to (1) may be viewed as a (2 + 1) addition of the carbene-like carbon of the isonitrile to the disilene, and represents the first clear example of such a reaction. In contrast, similar reactivity is nob observed for alkenes, but strained cyclic or electron rich alkynes are reported to react with isonitriles in benzene solution to form cyclopropenimines.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *SILICON COMPOUNDS, *CYCLIC COMPOUNDS, AIR, ALKENES, BENZENE,

AD-A187 662

AD-A187 662 CONTINUED

CHEMICAL BONDS, CHEMICAL REACTIONS, COLORS, CRYSTALS, EXPOSURE(GENERAL), MIXTURES, REACTIVITIES, RED(COLOR), RINGS, ROOM TEMPERATURE, SOLUTIONS(GENERAL), X RAYS, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 661 11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Reinforcement of a Non-Crystallizable Elastomer by the Precipitation In situ of Silica,

SEP 87

PERSONAL AUTHORS: Clarson, S. J.; Mark, J. E.

CONTRACT NO. DAAL03-86-K-0032, $AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, ARO
TR-87-1822, 23255.3-MS

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Communications, v28 p249-252 Sep 87.

ABSTRACT: (U) In situ hydrolysis of an alkoxysilane is used to reinforce an elastomer of poly(methylphenylsiloxane), which is inherently non crystallizable. Comparison of the increases in ultimate properties obtained with those obtained using a crystallizable polymer indicated that the capacity for undergoing strain-induced crystallization is not a requirement for good reinforcement. Keywords: Silica, Elastomers, Ultimate properties, Reinforcement, Ceramics, Catalyzed hydrolysis.

DESCRIPTORS: (U) *ELASTOMERS, *SILICON DIOXIDE, *REINFORCING MATERIALS, CERAMIC MATERIALS, CRYSTALLIZATION, HYDROLYSIS, POLYETHYLENE, PRECIPITATION, STRAIN(MECHANICS), POLYMERS, SILOXANES, SYNTHESIS(CHEMISTRY), FILLERS, STEREOCHEMISTRY, GEL PERMEATION CHROMATOGRAPHY, REPRINTS, MODULUS OF ELASTICITY, HYDROXYL RADICALS.

IDENTIFIERS: (U) Poly(Methyl Phenylsiloxane), Strain induced crystallization, PE61102F, WUAFOSR2303A3.

AD-A187 660 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Measuring Information in Right-Censored Models,

87 14P

PERSONAL AUTHORS: Hollander, Myles; Proschan, Frank; Sconing, James

REPORT NO. FSU-STATISTICS-M701

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1820

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Naval Research Logistics, v34 p669-681 1987.

ABSTRACT: (U) The theory of majorization is used to develop measures of information in the randomly right-censored model when the lifetime and censoring variables are discrete. Majorization also enables us to prove some basic theorems about the measures in a simple and unified fashion. These measures include Shannon's information as a special case. The measures are adequate in the continuous case and some alternative measures, based on the variance of the lifetime random variable, are proposed. Keywords: Reprints, Continuous life distribution models.

DESCRIPTORS: (U) *MEASUREMENT, *INFORMATION THEORY, CONTINUITY, LIFE EXPECTANCY(SERVICE LIFE), REPRINTS, THEOREMS, STATISTICAL DISTRIBUTIONS, RANDOM VARIABLES, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 659 12/3

OHIO STATE UNIV COLUMBUS

(U) The Independence Assumption for a Series or Parallel System when Component Lifetimes are Exponential.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 85-31 Oct 86,

AUG 86 7P

PERSONAL AUTHORS: Klein, John P.; Moeschberger, M. L.

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1818

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Reliability, vR-35 n3 p330-335 Aug 86.

ABSTRACT: (U) A common assumption made in modeling system life from series and parallel systems is that the component lives are independent. This study investigates the magnitude of the errors one may incur by erroneously assuming the component lifetimes have independent exponential distributions when in fact the lifetimes follow the bivariate exponential distribution of Marshall & Olkin (series or parallel systems) or that of Freund (parallel systems). Keywords: Reprints; Mathematical models.

DESCRIPTORS: (U) *EXPONENTIAL FUNCTIONS, *STATISTICAL DISTRIBUTIONS, BIVARIATE ANALYSIS, DISTRIBUTION FUNCTIONS, MATHEMATICAL MODELS, PARALLEL ORIENTATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A187 658 20/13

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) A Potential Well Theory for the Heat Equation with a Nonlinear Boundary Condition,

87 11P

PERSONAL AUTHORS: Levine, H. A.; Smith, R. A.

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-87-1819

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Methods in the Applied Sciences, v9 p127-136 1987.

ABSTRACT: (U) The present paper employs potential well arguments to obtain a sharp existence-nonexistence alternative for solution to the linear heat equation subject to a nonlinear boundary condition.

DESCRIPTORS: (U) *POTENTIAL THEORY, *HEAT TRANSFER, BOUNDARIES, EQUATIONS, HEAT, NONLINEAR SYSTEMS, REPRINTS.

IDENTIFIERS: (U) Existance theorems, Lebesque measure, Lipschitz confluence, Manifolds(Mathematics), Sobolev space, PE61102F, WUAFOSR2304A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 657 11/2 11/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Strengthening of Silica Glass by Gel-Derived Coatings,

86 8P

PERSONAL AUTHORS: Fabes, B. D.; Doyle, W.F.; Zelinski, B. J.; Silverman, L. A.; Uhlmann, D. R.

CONTRACT NO. AFOSR-85-0028

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1814

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Non-Crystalline Solids, v82 p349-355 1986.

ABSTRACT: (U) The use of sol-gel coatings to strengthen oxide glasses has been demonstrated for the case of fused silica. Increases in strength to as much as 2.2 times the strength of uncoated glass have been obtained. The strengthening does not involve the annealing of surface microcracks, but rather the filling-in of such flaws. The strengthening does not depend on coating thickness over the range 2000-10 000 A, but does depend significantly upon the state of hydrolysis of the substrate surface.

DESCRIPTORS: (U) *SILICA GLASS, *PROTECTIVE COATINGS, ANNEALING, COATINGS, FUSED SILICA, GLASS, HYDROLYSIS, MICROCRACKING, OXIDES, STRENGTH(GENERAL), SUBSTRATES, SURFACES, THICKNESS, TITANIUM DIOXIDE, SILICON DIOXIDE, SILANES, RODS, HIGH TEMPERATURE, THIN FILMS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A187 657

AD-A187 656 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Synthesis of Symmetrical Bis(aryl)sulfur Diimides,

87 3P

PERSONAL AUTHORS: Ding, Yi-Xiang; Weber, William P.

CONTRACT NO. AFOSR-86-0042

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1834

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v52 n20 p4625-4626 1987.

ABSTRACT: (U) The Peterson reaction involves the addition of an alpha silyl carbanion to the carbonyl group of a ketone or aldehyde to yield a beta silyl alkoxide, which decomposes to an alkene and a silanoate. Similarly, the reaction of the sodium salt of hexamethyldisilazene with nonenolizable ketones yields N-(trimethylsilylimines). Bis(trimethylsilyl)carbodiimide has been prepared by the reaction of sodium bis(trimethylsilyl) amide with phosgene, while reaction of lithium (trimethylsilyl) amides with sulfur dioxide gives N-sulfinylamines. We now report that symmetrical bisarylsulfur diimides can be prepared by reaction of lithium (trimethylsilyl) anilides with thionyl chloride.

DESCRIPTORS: (U) *SULFUR COMPOUNDS, *IMIDES, *SYNTHESIS(CHEMISTRY), *ARYL RADICALS, *X RAY SPECTROSCOPY, ALDEHYDES, ALKENES, AMIDES, DIOXIDES, KETONES, LITHIUM, PHOSGENE, RESPONSE, SALTS, SODIUM, SULFUR OXIDES, THIONYL CHLORIDE, YIELD, SILANES, CARBONYL COMPOUNDS.

IDENTIFIERS: (U) Peterson reaction, Beta silyl alkoxide, BIS(Trimethylsilyl)carbodiimide, Carbodiimide/ bis(Trimethylsilyl), Silandoate, *Diimides, PE61102F, WUAFOSR2303B2.

AD-A187 656

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 654 12/4

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) The Optimal Projection Equations for Reduced-Order State Estimation: The Singular Measurement Noise Case.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 6P

PERSONAL AUTHORS: Haddad, Wassim M.; Bernstein, Dennis S.

CONTRACT NO. AFOSR-86-0002

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1965

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n12 p1135-1139 Dec 87.

ABSTRACT: (U) The optimal projection equations for reduced-order state estimation are generalized to allow for singular (i.e., colored) measurement noise. The noisy and noise-free measurements serve as inputs to dynamic and static estimators, respectively. The optimal solution is characterized by necessary conditions which involve a pair of oblique projections corresponding to reduced estimator order and singular measurement noise intensity. Keywords: Reprints; Electrical engineering; Automatic control.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *NOISE REDUCTION, AUTOMATIC, CONTROL, ELECTRICAL ENGINEERING, EQUATIONS, ESTIMATES, INTENSITY, MEASUREMENT, NOISE, NOISE REDUCTION, NOISE(SOUND), OPTIMIZATION, REDUCTION, REPRINTS, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A187 654

AD-A187 653 9/1 12/3

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) Robust Static and Dynamic Output-Feedback Stabilization: Deterministic and Stochastic Perspectives,

DEC 87 10P

PERSONAL AUTHORS: Bernstein, Dennis

CONTRACT NO. F49620-86-C-0002, F49620-86-C-0038

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1978

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n12 p1076-1084 Dec 87.

ABSTRACT: (U) Three parallel gaps in robust feedback control theory are examined: sufficiency versus necessity, deterministic versus stochastic uncertainty modeling, and stability versus performance. Deterministic and stochastic output-feedback control problems are considered with both static and dynamic controllers. The static and dynamic robust stabilization problems involve deterministically modeled bounded but unknown measurable time-varying parameter variations, while the static and dynamic stochastic optimal control problems feature state, control-, and measurement-dependent white noise. General sufficiency conditions for the deterministic problems are obtained using Lyapunov's direct method, while necessary conditions for the stochastic problems are derived as a consequence of minimizing a a quadratic performance criterion. The sufficiency tests are then applied to the necessary conditions to determine when solutions of the stochastic optimization problems also solve the deterministic robust stability problems. As an additional application of the deterministic result, the modified Riccati equation approach of Petersen and Hollot is generalized in the static case and extended to dynamic compensation.

AD-A187 653

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 653 CONTINUED

DESCRIPTORS: (U) *CONTROL THEORY, *FEEDBACK, *STATISTICAL PROCESSES, COMPENSATION, DETERMINANTS(MATHEMATICS), DYNAMICS, MEASUREMENT, OPTIMIZATION, PARAMETERS, QUADRATIC EQUATIONS, REPRINTS, RICCATI EQUATION, STABILITY, STABILIZATION, STATICS, STOCHASTIC PROCESSES, TIME, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A187 652 12/2

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) The Majorant Lyapunov Equation: A Nonnegative Matrix Equation for Robust Stability and Performance of Large Scale Systems.

DESCRIPTIVE NOTE: Journal article,

NOV 87 10P

PERSONAL AUTHORS: Hyland, David C.; Bernstein, Dennis S.

CONTRACT NO. F49620-86-C-0002, F49620-86-C-0038

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1979

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n11 p1005-10 3 Nov 87.

ABSTRACT: (U) A new robust stability and performance analysis technique is developed. The approach involves replacing the state covariance by its block-norm matrix, i.e., the nonnegative matrix whose elements are the norms of subblocks of the covariance matrix partitioned according to subsystems dynamics. A bound (i.e., majorant) for the block norm matrix is given by the majorant Lyapunov equation, a Lyapunov-type nonnegative matrix equation. Existence, uniqueness, and computational tractability of solutions to the majorant Lyapunov equations are shown to be completely characterized in terms of M matrices. Two examples are considered. For a damped simple harmonic oscillator with uncertain but constant natural frequency, the majorant Lynapunov equation predicts unconditional stability. And, for a pair of nominally uncoupled oscillators with uncertain coupling, the majorant Lyapunov equation shows that the range of nondestabilizing couplings is proportional to the frequency separation between the oscillators, a result not predictable from quadratic or vector Lyapunov functions.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 652 CONTINUED

DESCRIPTORS: (U) *LYAPUNOV FUNCTIONS, *CONTROL SYSTEMS, COMPUTATIONS, COUPLINGS, COVARIANCE, DAMPING, DYNAMICS, EQUATIONS, FREQUENCY, HARMONIC GENERATORS, OSCILLATORS, PERFORMANCE TESTS, QUADRATIC EQUATIONS, REPRINTS, RESONANT FREQUENCY, SEPARATION, SOLUTIONS(GENERAL), TRACTABLE, VECTOR ANALYSIS, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Robust procedures, PE61102F, WUAFOSR2304A1.

AD-A187 651 7/2

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Vibrationally State-Selected Reactions of Ammonia Ions. 3. NH3(+)(v)+ND3 and ND3(+)(v)+NH3,

SEP 87 9P

PERSONAL AUTHORS: Conaway, William E.; Ebata, Takayuki; Zare, Richard N.

CONTRACT NO. F49620-86-C-0016

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1816

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n6 p3453-3460, 15 Sep 87. See also Part 1, AD-A173 151.

ABSTRACT: (U) The role of vibrational excitation of the umbrella bending mode of ND3 and ammonia ion on the reaction with NH3 and ND3 is examined over the 2 to 12 eV center of mass kinetic energy range. Isotopic substitution permits the investigation of charge transfer, proton/deuteron transfer, and neutral atom abstraction. The charge transfer channel is moderately enhanced by excitation of the ammonia ion v2 vibrational mode. The proton/deuteron channel is suppressed by vibrational excitation of the ion at low kinetic energies. The hydrogen/deuterium atom abstraction channels show nearly a factor of 6 vibrational enhancement relative to NH3 ion. The ion vibrational and translational energy play inequivalent roles in the reactions, indicating that nonstatistical factors are important in the transition from reactant to product channels. A simple dynamical model is offered to explain both the proton/deuteron transfer and the neutral atom abstraction reactions; it is based on the argument that vibrational motion along the particle transfer coordinate promotes reaction while vibrational motion perpendicular to the transfer coordinate hinders reaction.

DESCRIPTORS: (U) *AMMONIA, *CHARGE TRANSFER, *IONS,

AD-A187 652

AD-A187 651

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 651 CONTINUED

ATOMS, CHANNELS, COORDINATES, DEUTERIUM, DEUTERONS, DYNAMICS, ENERGY, ENERGY TRANSFER, EXCITATION, HYDROGEN, ISOTOPES, KINETIC ENERGY, LOW ENERGY, MASS, MOTION, NEUTRAL, PARTICLES, PROTONS, REACTANTS(CHEMISTRY), SUBSTITUTES, TRANSFER, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A187 650 6/2

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Vibrationally State-Selected Reactions of Ammonia Ions. 2. NH3(+)(v)+CH4.

SEP 87 7P

PERSONAL AUTHORS: Conaway, William E.; Ebata, Takayuki; Zare, Richard N.

CONTRACT NO. F49620-86-C-0016

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1815

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n6 p3447-3452, 15 Sep 87. See also Part 3, AD-A187 651.

ABSTRACT: (U) The effects of vibrational excitation of the ammonia inversion mode on the reaction of the ammonia ion with methane have been measured in a tandem quadrupole mass spectrometer over the center of mass collision energy range 1.5 to 10 eV. The hydrogen abstraction channel is enhanced by nearly a factor of 2 at nine quanta of vibrational energy relative to the u = 0 level of the ion. Added vibrational in the ammonia ion umbrella-bending mode facilitates the transition to the NH4 product ion geometry. Protonated methylamine is formed at lower kinetic energies by attack of the ion at the methane carbon center, but with increasing vibrational excitation of the ammonia ion, the protonated methylamine decomposes by 1,2-elimination of molecular hydrogen and by C-N bond scission.

DESCRIPTORS: (U) *AMMONIA, *INVERSION, *IONS, CARBON, ENERGY, EXCITATION, HYDROGEN, KINETIC ENERGY, LOW ENERGY, MASS SPECTROMETERS, METHANE, QUADRUPOLE MOMENT, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A187 651

AD-A187 650

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 647 20/4

CINCINNATI UNIV OHIO DEPT OF AEROSPACE ENGINEERING

(U) Consistent Strongly Implicit Iterative Procedures for Two-Dimensional Unsteady and Three-Dimensional Space-Marching Flow Calculations.

87 18P

PERSONAL AUTHORS: Khosla, P. K.; Rubin, S. G.

CONTRACT NO. F49620-85-C-0027

MONITOR: AFOSR TR-87-1612

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Computers and Fluids, v15 n4 p361-377 1987.

ABSTRACT: (U) First and second-order accurate the consistent versions of the coupled strongly implicit procedure (CSIP) have been developed and investigated for diffusion, potential flow and reduced Navier-Strokes (RNS equations. Typical examples for the flow over an airfoil and a flat plate at incidence are presented. The method is also applicable to space marching for 3-D flows. Primitive variable forms of the (RNS) and the boundary region equations are considered for low speed flow near the trailing edge of a finite-span plate for supersonic flow over a cone at incidence, respectively. The composite velocity formulation is considered for flow over a cylinder of rectangular cross-section.

DESCRIPTORS: (U) *POTENTIAL FLOW, *NAVIER STOKES EQUATIONS, AIRFOILS, BOUNDARIES, CONICAL BODIES, CROSS SECTIONS, CYLINDRICAL BODIES, EQUATIONS, FLAT PLATE MODELS, FLOW, FORMULATIONS, ITERATIONS, LOW VELOCITY, RECTANGULAR BODIES, SUPERSONIC FLOW, TRAILING EDGES, VELOCITY, THREE DIMENSIONAL FLOW, REPRINTS.

IDENTIFIERS: (U) CSIP(Coupled Strongly Implicit Procedure).

AD-A187 646 21/2

EMORY UNIV ATLANTA GA

(U) Studies of Fluorine Combustion.

DESCRIPTIVE NOTE: Final rept. 8 Jan 86-31 Jul 87,

SEP 87 4P

PERSONAL AUTHORS: Kaufman, Myron

CONTRACT NO. AFOSR-86-0220

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1923

UNCLASSIFIED REPORT

ABSTRACT: (U) This program has funded the purchase of a Coherent Inc. CW ring dye laser with intracavity doubling capability exacted by an 18 watt Ar ion laser. This laser system will be employed as a sensitive and specific probe for intermediates in the combustion of various fuels in F2. Because of their extreme exothermicity, many such reactions have considerable potential for propulsion applications. Keywords: Laser, Fluorine, Combustion.

DESCRIPTORS: (U) *COMBUSTION, *FLUORINE, *FUELS, CONTINUOUS WAVE LASERS, DYE LASERS, IONS, LASERS, PROBES, PROPULSION SYSTEMS, RING LASERS, SENSITIVITY, ARGON LASERS, COUMARINS, FLAMES, FUEL BURN UP, COMBUSTION CHAMBER GASES, LASER INDUCED FLUORESCENCE, COMBUSTION PRODUCTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 645 20/6 20/12 AD-A187 645 CONTINUED

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS WUAFOSR2306A3

(U) Application of Nondestructive Testing Techniques to Materials Testing.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 86,

NOV 87 10P

PERSONAL AUTHORS: Kino, G. S.

REPORT NO. GL-4294

CONTRACT NO. AFOSR-84-0063

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR TR-87-1927

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this work during the last year has been to carry out research on new types of optical microscopes which gives better resolution in both the transverse and range directions than standard high-quality optical microscopes. The reason for carrying out such studies is that there is a need for measurements of semiconductor profiles with submicron resolution. The scanning electro microscope has excellent transverse resolution, but poor range resolution; it must be used in a vacuum, and it can damage sensitive semiconductor materials. We have been working with new scanning optical microscope concepts which provide excellent range resolution, of the order of 10nm, less, and transverse resolutions of the order of 200nm, and with computer processing as good as 130nm.

DESCRIPTORS: (U) *MICROSCOPES, *SEMICONDUCTORS, *NONDESTRUCTIVE TESTING, COMPUTERS, PROCESSING, MATERIALS, TEST AND EVALUATION, OPTICAL PROPERTIES, PROFILES, ORIENTATION(DIRECTION), TRANSVERSE, DAMAGE, MATERIALS, SEMICONDUCTORS, SENSITIVITY, TEST METHODS, RESOLUTION, TRANSVERSE, HIGH RESOLUTION.

IDENTIFIERS: (U) *Scanning optical microscopes, PE61102F,

AD-A187 645 AD-A187 645

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 644 20/2 20/12

COLORADO UNIV AT BOULDER

(U) Laser Measurements of State-Resolved Ga and In Atom Sticking and Desorption on Metal and Semiconductor Surfaces.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 86-30 Nov 87,

DEC 87 9P

PERSONAL AUTHORS: Leone, Stephen R.

CONTRACT NO. AFOSR-87-0119

PROJECT NO. 2305

TASK NO. K4

MONITOR: AFOSR TR-87-1925

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is carried out on the dynamics of Ga and As scattering, sticking, and desorption from silicon single crystals using laser probing of the Ga and As (dimer) gas phase species. In the last six months, results have been obtained for the binding energy of Ga om silicon. Structural patterns of Ga on silicon at various coverages have been determined by LEED studies. Results have been obtained for the desorption of two different Ga spin-orbit states and a model developed to explain the observed behavior. The desorption pre-exponential factors suggest a one-dimensional mobility of Ga on silicon. These results are relevant to the epitaxial growth of GaAs on silicon. Keywords: Semiconductors, Surfaces, Lasers, Gallium arsenides.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *GALLIUM ARSENIDES, *LASERS, *SEMICONDUCTORS, *SILICON, *SINGLE CRYSTALS, ATOMS, DESORPTION, DYNAMICS, GALLIUM, METALS, MOBILITY, NUCLEAR BINDING ENERGY, ONE DIMENSIONAL, ORBITS, SCATTERING, SPIN STATES, SURFACES, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305K47.

AD-A187 644

AD-A187 643 7/4

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

(U) Charge Exchange in Low Energy (keV) and Hyperthermal Energy (10-100eV) Ion Scattering.

DESCRIPTIVE NOTE: Final rept. 1 Apr 86-15 Nov 87,

DEC 87 14P

PERSONAL AUTHORS: Cooper, Barbara H.

CONTRACT NO. AFOSR-86-0086

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-1926

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall research program described in this report is to investigate the interaction of low (keV) and hyperthermal (10-100 eV) ions with clean and adsorbate-covered metal surfaces; in particular, ion-surface charge exchange processes. We report on the operation of the UHV scattering apparatus for the ion scattering measurements, ongoing development and upgrade of the apparatus, the use of two ion scattering simulations which together cover the entire energy range of interest, the further development of these simulations, and most importantly, the ongoing experiments to determine charge transfer probabilities. The data we present in this report are representative of the scattering spectra we measure. Completed analysis of these and similar spectra will be presented in forthcoming papers. To date, we have measured spectra for Li+, Na+, K+, He+, Ne+, and Ar+ beams, ranging in energy from 50 eV to 4 keV, scattered from the <001> and <1-10> azimuths of Cu(110). Important features of these spectra have been identified with the scattering simulations. Keywords: Hyperthermal ion beams, Resonant charge exchange, Scattering dynamics, Ion scattering instrumentation.

DESCRIPTORS: (U) *CHARGE TRANSFER, *ION EXCHANGE,

AD-A187 643

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 643 CONTINUED

*EXCHANGE REACTIONS, *ULTRAVIOLET RADIATION, DYNAMICS, ENERGY, HIGH TEMPERATURE, INSTRUMENTATION, ION BEAMS, IONS, LOW ENERGY, MEASUREMENT, METALS, PROBABILITY, RESONANCE, SCATTERING, SIMULATION, SPECTRA, SURFACES, ADSORBATES, LITHIUM, SODIUM, POTASSIUM, HELIUM, NEON, ARGON, COPPER, CRYSTAL STRUCTURE, ELECTROSTATIC ANALYZERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A187 642 20/4

PRINCETON UNIV N J GAS DYNAMICS LAB

(U) The Structure and Control of Three-Dimensional Shock Wave Turbulent Boundary Layer Interactions.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 86-14 Jul 87,

NOV 87 20P

PERSONAL AUTHORS: Bogdonoff, Seymour M.

CONTRACT NO. F49620-86-C-0094

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-87-1932

UNCLASSIFIED REPORT

ABSTRACT: (U) A review of the work completed during the first year of research on the subject contract is presented. Papers and publications generated, staff, and students involved in research are noted, along with a brief description of the on-going program. Significant results have been obtained in defining the structure of the three-dimensional shock wave turbulent boundary layer interaction by combining detailed experiments with coordinated major computational programs. Keywords: Shock wave, Boundary layer, Supersonic.

DESCRIPTORS: (U) *SHOCK WAVES, *TURBULENT BOUNDARY LAYER, *INTERACTIONS, *SUPERSONIC FLOW, COMPUTATIONS, THREE DIMENSIONAL FLOW, PRESSURE GRADIENTS, UNSTEADY FLOW, VORTICES, FLOW SEPARATION, PRESSURE, WALLS, FINS.

IDENTIFIERS: (U) Shock generators, PE61102F, WUAFOSR2307A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 641 21/5

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE LAB

(U) Air Force Research in Aero Propulsion Technology.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 86-31 Aug 87,

DEC 87 18P

PERSONAL AUTHORS: Greitzer, Edward M.; Epstein, Alan H.; Tan, Choon S.; Giles, Michael B.; Martinez-Sanchez, Manuel

CONTRACT NO. AFOSR-85-0288

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-87-1924

UNCLASSIFIED REPORT

ABSTRACT: (U) The work consisted of six separate projects: 1. Rotor Dynamic Instability due to Alford Forces; 2. Turbocharger Stall; 3. Three-Dimensional Flows in Turbomachines; 4. Computational Techniques for Turbomachine Flows; 5. Active Stabilization of Surge; 6. Fluid Physics of High Pressure Ratio Turbines; and was carried out as part of the Air Force Research in Aero Propulsion Technology (AFRAPT) Program. Keywords: Unsteady Flow in Turbomachines, Computational Fluid Mechanics, Centrifugal Compressor Stall, Turbine Heat Transfer, Rotor Dynamic Instability.

DESCRIPTORS: (U) *TURBOJET ENGINES, STABILIZATION, SURGES, CENTRIFUGAL COMPRESSORS, STALLING, COMPUTATIONS, HIGH PRESSURE, RATIOS, TURBINES, THREE DIMENSIONAL FLOW, TURBOCHARGERS, TURBOMACHINERY, AIR FORCE RESEARCH, FLUID MECHANICS, DYNAMICS, ROTORS, STABILITY, HEAT TRANSFER, UNSTEADY FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A4

AD-A187 640 11/6.2

HENRY KRUMB SCHOOL OF MINES NEW YORK CENTER FOR STRATEGIC MATERIALS

(U) Understanding the HIP (Hot Isostatic Pressing) Consolidation of P/M Nickel-Base Superalloys.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-31 Sep 87,

NOV 87 69P

PERSONAL AUTHORS: Tien, John K.

CONTRACT NO. AFOSR-82-0352

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-1893

UNCLASSIFIED REPORT

ABSTRACT: (U) Superalloy processing, and hot isostatic pressing (P) is near-net shape is the most cost-effective method of superalloy powder consolidation. However, as HIP superalloys have ben plagued by poor mechanical properties, which can be ascribed to materials cleanliness and to prior particle powder boundaries (PPB). The solution to the first problem is the policing of the process, and the solution to the second problem is more technical and pivots about altering the deformation mechanism comprising HIP densification to minimize PPB.

DESCRIPTORS: (U) *HOT PRESSING, *ISOSTATIC PRESSING, *SUPERALLOYS, BOUNDARIES, COST EFFECTIVENESS, DEFORMATION, MECHANICAL PROPERTIES, PARTICLES, PIVOTS, POWDERS, PROCESSING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 633 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Optimal Arrangement of Components Via Pairwise Rearrangements.

DESCRIPTIVE NOTE: Journal article,

OCT 87 13P

PERSONAL AUTHORS: Boland, Philip J.; Proschan, Frank; Tong, Y. L.

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1600

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Georgia Inst. of Tech., Atlanta. School of Mathematics.

ABSTRACT: (U) The authors introduce the notion of comparison of the criticality of two nodes in a coherent system, and develop a monotonicity property of the reliability function under component pairwise rearrangement. They use this property to find the optimal component arrangement. Worked examples illustrate the methods proposed. Keywords: Optimization; Permutations; Nodes.

DESCRIPTORS: (U) *OPTIMIZATION, *PERMUTATIONS, COHERENCE, RELIABILITY, NODES, COMPARISON, CRITICALITY(GENERAL), STATISTICAL PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A187 632 13/6 14/2

MARYLAND UNIV COLLEGE PARK

(U) On the Maneuvering of Vehicles,

87 14P

PERSONAL AUTHORS: Alexander, James C.; Maddocks, J. H.

CONTRACT NO. AFOSR-87-0073

MONITOR: AFOSR TR-87-1434

UNCLASSIFIED REPORT

ABSTRACT: (U) Equations are derived to govern the motion of vehicles which move on rolling wheels. A relation between the centers of curvature of the trajectories of the wheels and the center of rotation of the vehicle is established. From this relation the general kinematic laws of motion are derived. Applications to questions of offtracking (the difference between the trajectories of the front and back wheels of the vehicle) and optimal steering (how to steer around a tight corner) are considered. Keywords. Euler-Savary formulae, Offtracking, Optimal steering.

DESCRIPTORS: (U) *GROUND VEHICLES, *TRUCKS, *ROAD TESTS, WHEELS, EQUATIONS, MOTION, ROLL, TIGHTNESS, CURVATURE, MANEUVERABILITY, VEHICLES, OPTIMIZATION, STEERING, TRAJECTORIES.

IDENTIFIERS: (U) Wheeled vehicles.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 630 12/1

MARYLAND UNIV COLLEGE PARK

(U) *Small Degree Solutions for the Polynomial Bezout* Equation,

JUL 87 23P

PERSONAL AUTHORS: Berenstein, Carlos A.; Struppa, Daniele C.; Superiore, Scuola N.

REPORT NO. TR-86-74

CONTRACT NO. AFOSR-87-0073

MONITOR: AFOSR
TR-87-1441

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this paper is to briefly report on some new advances due to Brownawell on the problem of explicit (concretely computable) solutions to the Bezout equations, which are based on some recent developments in complex analysis due to Yger and the authors. Keywords: Polynomials; Variables; Integrals.

DESCRIPTORS: (U) *INTEGRAL EQUATIONS, POLYNOMIALS, SOLUTIONS(GENERAL), VARIABLES.

IDENTIFIERS: (U) *Bezout equations.

AD-A187 630

AD-A187 621 1/1 12/2

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF MATHEMATICS

(U) Well-Posedness and Spectral Estimation for Infinite Dimensional Systems.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-15 Sep 87,

SEP 87 5P

PERSONAL AUTHORS: Beattie, C. A.; Herdman, T. L.

CONTRACT NO. AFOSR-84-0326

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-87-1578

UNCLASSIFIED REPORT

ABSTRACT: (U) We developed a mathematical model for the motions of an airfoil, with flap, in a two dimensional unsteady flow of an inviscid, incompressible fluid. We established necessary and sufficient conditions for the well-posedness for a large class of functional differential equations containing those used to model the aeroelastic system. Significant progress has been made in developing efficient numerical approaches for resolving intermediate problems. Further work has provided refined rate estimates for the closure of spectral estimates and a formulation for resonances of sparse frame structures has been developed and tested.

DESCRIPTORS: (U) *AEROELASTICITY, *AIRFOILS, *MATHEMATICAL MODELS, CLOSURES, DIFFERENTIAL EQUATIONS, EFFICIENCY, ESTIMATES, FLUIDS, FRAMES, FUNCTIONAL ANALYSIS, INCOMPRESSIBILITY, INVISCID FLOW, NUMERICAL METHODS AND PROCEDURES, RATES, STRUCTURES, TWO DIMENSIONAL FLOW, UNSTEADY FLOW, EQUATIONS OF MOTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

AD-A187 621

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 616 14/2 7/2

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Apparatus for the Study of Silicon Film Deposition and Silicon Etching.

DESCRIPTIVE NOTE: Final rpt. 1 Aug 86-31 Jul 87,

JUL 87 4P

PERSONAL AUTHORS: Benziger, Jay

CONTRACT NO. AFOSR-86-0217

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-1588

UNCLASSIFIED REPORT

ABSTRACT: (U) A special vacuum system used to study the surface reactions in thin film deposition and etching was equipped with surface analytical techniques and ion sputtering for preparing and characterizing surfaces. X-ray and ultraviolet photoelectron spectroscopy systems were obtained from Vacuum Science Workshop and installed in a 2-chamber vacuum system along with an ion sputtering gun for sample cleaning. These techniques will be used in conjunction with infrared ellipsometry and modulated molecular beam techniques to elucidate the kinetics and mechanisms of surface reactions of silicon deposition and etching.

DESCRIPTORS: (U) *DEPOSITION, *ETCHING, *SILICON, *THIN FILMS, ELLIPSOMETERS, FILMS, GUNS, INFRARED RADIATION, IONS, MODULATION, MOLECULAR BEAMS, PHOTOELECTRON SPECTRA, SPUTTERING, SURFACE REACTIONS, SURFACES, ULTRAVIOLET SPECTROSCOPY, VACUUM, VACUUM APPARATUS, WORKSHOPS.

IDENTIFIERS: (U) PE61102F, WUAFOSR219A2.

AD-A187 616

AD-A187 614 21/2 14/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Combustion Dynamics of Solid Propellants.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Jun 86,

OCT 86 11P

PERSONAL AUTHORS: Price, E. W.

CONTRACT NO. AFOSR-84-0183

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1426

UNCLASSIFIED REPORT

ABSTRACT: (U) Development of facilities for studies of high temperature decomposition of solid propellent ingredients are described, particularly as they pertain to use of the subject DoD Equipment Grant. Funding from the Grant was used for laboratory support equipment and peripheral equipment on existing experiments, but primarily for purchase of 1200 watt CO2 laser and related beam optics and support equipment. This apparatus will permit heating of ingredient samples at surface heat fluxes common in propellent combustion, involving temperature rise at the surface. Combustion research indicates that situations, giving considerable urgency to development of high rate situations, giving considerable urgency to development of high rate experiments. Keywords: Pyrolysis, Propellent, Combustion, High Temperature, Carbon dioxide laser.

DESCRIPTORS: (U) *COMBUSTION, OPTICS, COMBUSTION, DYNAMICS, HIGH RATE, DECOMPOSITION, HIGH TEMPERATURE, PYROLYSIS, HEAT FLUX, SURFACES, LABORATORY EQUIPMENT, SOLID PROPELLANTS, CARBON DIOXIDE LASERS, LABORATORY TESTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

AD-A187 614

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 601 12/3

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) A Queueing System with Independent Markov Input Streams.

DESCRIPTIVE NOTE: Technical rept. 1 Jan-31 Dec 87,

87 20P

PERSONAL AUTHORS: Stavrakakis, I.; Dazakos, D.

REPORT NO. UVA/525677/EE87/101

CONTRACT NO. AFOSR-87-0095

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1619

UNCLASSIFIED REPORT

ABSTRACT: (U) In this work, a discrete time single server queueing system with arbitrary (finite) number of input streams, is considered. The input streams are assumed to be independent but successive arrivals in a single stream are not. More specifically, it is assumed that for each stream, arrivals are governed by an underlying finite state space Markov chain and that a visit to a state corresponds to one or none arrivals, according to a stationary mapping rule. The first in-first out service policy is adopted. For the system described above we develop a method to calculate the average number of customers in the queuing system. Then, the mean time that a customer spends in the system is calculated by using Little's theorem.

DESCRIPTORS: (U) *TIME, *QUEUEING THEORY, *MARKOV PROCESSES, MEAN, STREAMS, INPUT, MAPPING(TRANSFORMATIONS), INPUT OUTPUT PROCESSING.

IDENTIFIERS: (U) Little theorem, Markov chains, WUAFOSR2304A5, PE61102F.

AD-A187 601

AD-A187 592 13/5 20/11

MARYLAND UNIV COLLEGE PARK

(U) The Dynamics of Two Coupled Rigid Bodies,

OCT 87 7P

PERSONAL AUTHORS: Grossman, R.; Krishnaprasad, P. S.; Marsden, Jerrold E.

CONTRACT NO. AFOSR-87-0073, $NSF-OIR85-00108

MONITOR: AFOSR
TR-87-1432

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper we derive a Poisson bracket on the phase space so(3) x so(3) x SO(3) such that the dynamics of two three dimensional rigid bodies coupled by a ball and socket joint can be written as a Hamiltonian system. This paper we introduce a Poisson bracket on the phase space. SO(3) is the dual of the Lie algebra of SO(3) , so that the dynamics of two rigid bodies coupled by a ball and socket joint can be written as the Hamiltonian system H = (F,H). This sets the stage so that the stability and asymptotics of the system can be studied using the energy Casimir method as in Holm, Marsden, Ratiu and Weinstein 1985 and Krishnaprasad 1985; so that chaotic solutions can be found using the Melnikov method such as in Holmes and Marsden 1983; so that bifurcations of the system can be described using the techniques in Golubitsky and Stewart 1986 and Lewis, Marsden and Ratiu 1986; and so that control issues can be studied, as in Sanchez de Alvarez 1986.

DESCRIPTORS: (U) *HAMILTONIAN FUNCTIONS, *BALL JOINTS, CONNECTORS, COUPLING(INTERACTION), DYNAMICS, POISSON DENSITY FUNCTIONS, RIGIDITY, LAGRANGIAN FUNCTIONS.

IDENTIFIERS: (U) Lie algebra, Poisson brackets, *Rigid body motion.

AD-A187 592

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 586 12/9

ARKANSAS UNIV FAYETTEVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Adaptive Hybrid Picture Coding.

DESCRIPTIVE NOTE: Interim Scientific rept. 30 Sep 85-30 Sep 86,

NOV 86 98P

PERSONAL AUTHORS: Jones, Richard A.

CONTRACT NO. AFOSR-84-0322

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR TR-87-1652

UNCLASSIFIED REPORT

ABSTRACT: (U) In order to recognize 3-dimensional objects in 2-dimensional scenes a shape description, complete enough to determine the 3-dimensional object, must be recovered from the scene. Although it is possible to recover some 3-dimensional information, for instance shape from shade (21) or shape from texture (13), in general the information recovered will be a 2-dimensional representation of the object. Many methods are available for interpreting 3-dimensional objects in 2-dimensional arrayed range images (3), 20; however this is considered as a somewhat different problem, since depth information can be derived from the scene with little or no ambiguity. Keywords: Minimax rixk quantizers; Concavities.

DESCRIPTORS: (U) *IMAGE PROCESSING, ADAPTIVE SYSTEMS, CODING, DEPTH, HYBRID SYSTEMS, IMAGES, PICTURES, SHAPE, PROJECTIVE TECHNIQUES, TWO DIMENSIONAL, SHADOWS, PHOTOGRAPHIC TEXTURE, MINIMAX TECHNIQUE.

IDENTIFIERS: (U) Scene analysis, Shading, WUAFOSR2305B3, PE61102F.

AD-A187 578 12/2

MARYLAND UNIV COLLEGE PARK

(U) Dynamic Observers as Asymptotic Limits of Recursive Filters: Special Cases,

DEC 86 21P

PERSONAL AUTHORS: Baras, J. S.; Bensoussan, A.; James, M. R.

CONTRACT NO. N00014-83-K-0731, $AFOSR-87-0073

MONITOR: AFOSR TR-87-1439

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants $NSF-CDR85-00108 and $NSF-INT84-13793.

ABSTRACT: (U) The authors' objective is to describe a method for constructing an observer for a certain dynamical system as the asymptotic limit of nonlinear filters associated with the noisy version of another document entitled Dynamic Observers as Asymptotic Limits of Recursive Filters. Keywords: Linear systems; Large deviations.

DESCRIPTORS: (U) *RECURSIVE FILTERS, *CONTROL THEORY, DYNAMICS, FILTERS, LINEAR SYSTEMS, NONLINEAR SYSTEMS, ASYMPTOTIC SERIES, KALMAN FILTERING, BROWNIAN MOTION, RICCATI EQUATION, FEEDBACK, OPTIMIZATION.

IDENTIFIERS: (U) *Nonlinear filtering, Associative filtering.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 569 9/1 9/3

NOTRE DAME UNIV IN DEPT OF PHYSICS

(U) Vibrational, Mechanical, and Thermal Properties of III-V Semiconductors.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-31 Aug 87,

SEP 87 12P

PERSONAL AUTHORS: Dow, John D.; Kasowski, R. V.; Tsai, M. H.

CONTRACT NO. AFOSR-85-0331

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR TR-87-1585

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in collaboration with du Pont de Nemours (E. I.), Wilmington, DE.

ABSTRACT: (U) Theories of the mechanical, vibrational, and electronic properties of III-V semiconductors have been developed and applied to (i) help determine the feasibility of InN-based visible and ultraviolet lasers and light detectors, (ii) develop a theory of phonons in semiconductor alloys, (iii) elaborate on the physics of photoelasticity, (iv) understand surface reconstruction of semiconductors, and (v) predict the effects of atomic correlations on the light-scattering (Raman) properties of semiconductor alloys.

DESCRIPTORS: (U) *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *PHOTOELASTICITY, *SEMICONDUCTORS, *ULTRAVIOLET LASERS, ALLOYS, ATOMIC PROPERTIES, CORRELATION TECHNIQUES, DETECTORS, ELECTRONICS, LIGHT, PHONONS, PHYSICS, THEORY, THERMAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B2.

AD-A187 569

AD-A187 567 7/4

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Theory of Laser-Simulated Surface Processes. 3. Desorption through Vibrational Excitation by an IR Laser,

OCT 87 8P

PERSONAL AUTHORS: Beri, A. C.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1621

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n7 p4147-4153, 1 Oct 87. See also Part 1, AD-A119 193.

ABSTRACT: (U) Desorption of an adatom from a solid surface through vibrational excitation by an IR laser is studied using a generalized master equation approach and the isomnesic approximation. A sharp transition from no desorption to almost instantaneous desorption is seen as the bound to continuum population transfer rate is varied. The critical rate increases linearly with laser power. Keywords: Reprints; Infrared lasers; Laser induced desorption; Vibrational excitation; Theoretical approach; Generalized master equation; Linear laser power dependence.

DESCRIPTORS: (U) *DESORPTION, *ADATOMS, *LASER PUMPING, POPULATION(MATHEMATICS), RATES, TRANSFER, STIMULATION(GENERAL), SURFACES, REPRINTS, SOLIDS, INFRARED LASERS, POWER, LINEAR SYSTEMS, EQUATIONS, SHARPNESS, TRANSITIONS, EXCITATION, VIBRATION, RADIATION ABSORPTION, LASER APPLICATIONS, SURFACE CHEMISTRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A187 567

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 566 7/5

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Energy-Transfer Theory for the Classical Decay Rates of Molecules at Rough Metallic Surfaces,

SEP 87 8P

PERSONAL AUTHORS: Leung, P. T.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1630

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v36 n9 p4664-4670, 15 Sep 87.

ABSTRACT: (U) The problem of the decay rates for molecules at rough metallic surfaces is considered, where the classical electromagnetic energy transfer theory of Chance, Prock and Silbey for a flat surface is generalized to the case of a rough boundary. A dynamical theory is constructed through the combination of the Sommerfield antenna theory and the integral equation formalism of Maxwell's equation at rough boundaries established mainly by Maradudin, Mills and Agarwal. Perturbative solutions ae obtained and numerical results are given with reference to a shallow sinusoidal grating surface. The results, when compared with those previously from the application of the image field theory, show that this latter theory can be very inaccurate for cases involving highly-conducting substrates or large molecule-surface distances, consistent with previous observations for the case of flat surfaces. Keywords: Energy transfer, Classical decay rates, Molecules, Rough metallic surfaces, Sommerfield antenna theory, Maxwell's equations.

DESCRIPTORS: (U) *PHOTOCHEMICAL REACTIONS, *CATALYSIS, *LASER PUMPING, ANTENNAS, BOUNDARIES, DECAY, DYNAMICS, ELECTROMAGNETIC RADIATION, ELECTROMAGNETISM, ENERGY TRANSFER, FIELD THEORY, IMAGES, INTEGRAL EQUATIONS, MAXWELLS EQUATIONS, METALS, MOLECULES, NUMERICAL ANALYSIS,

AD-A187 566

AD-A187 566 CONTINUED

RATES, ROUGHNESS, SURFACE ROUGHNESS, REPRINTS, LASER APPLICATIONS, SURFACE CHEMISTRY, ADSORPTION.

IDENTIFIERS: (U) Sommerfield antenna theory, PE61102F, WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 565 7/3 7/6 20/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) A Liquid Crystalline Poly(organophosphazene),

87 3P

PERSONAL AUTHORS: Kim, Chulhee; Allcock, Harry R.

CONTRACT NO. AFOSR-84-0147

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1638

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromoles, v20 p1726-1727 1987.

ABSTRACT: (U) Polyphosphazenes comprise a broad class of macro-molecules with the general formula (NPR2)n: The physical properties of polyphosphazenes can be understood in terms of a highly flexible backbone, with specific physical or chemical characteristics imposed by the side groups. This side-group influence depends on the size, shape, polarity, and flexibility of the side units. In earlier work, we have explored the influence on the polymer properties exerted by flexible aliphatic side groups or rigid units such as phthalocyanine, TCNQ, steroidal, and other planar or rigid structures, both linked directly to the chain and separated from it by flexible spacer groups. One objective of these studies was to identify those molecular structural features that might lead to side-chain liquid crystalline behavior. A conclusion reached from these studies was that liquid crystalline behavior was probably accessible provided the appropriate mesogenic groups could be linked to the polyphosphazene chain through a sufficiently flexible spacer unit. Thus, our recent studies have focused on the synthesis of polymer 1, a species in which the mesogenic aromatic azo unit is linked to the polymer chain through tri(ethylene oxide) spacer groups.

DESCRIPTORS: (U) *LIQUID CRYSTALS, *PHOSPHAZENE,

AD-A187 565

AD-A187 565 CONTINUED

*POLYMERS, AROMATIC COMPOUNDS, DIAZO COMPOUNDS, ALIPHATIC COMPOUNDS, SPACERS, PHTHALOCYANINES, PHYSICAL PROPERTIES, POLYMERS, CHEMICAL PROPERTIES, FORMULATIONS(CHEMISTRY), ORGANIC COMPOUNDS, PLANAR STRUCTURES, RIGIDITY, BEHAVIOR, SYNTHESIS(CHEMISTRY), REPRINTS, CHEMICAL RADICALS, CHEMICAL BONDS, ETHYLENE OXIDE, CHAINS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 563 20/3

MINNESOTA UNIV MINNEAPOLIS SCHOOL OF PHYSICS AND ASTRONOMY

(U) Superconductivity of Thin Film Intermetallic Compounds.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 86-31 Aug 87,

SEP 87 33P

PERSONAL AUTHORS: Goldman, A. M.

CONTRACT NO. AFOSR-84-0347

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR TR-87-1586

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigations of both macroscopic and microscopic properties of thin film superconducting materials have been carried out. Compounds under study prior to the discovery of high-Tc superconductors, were either technologically significant, or involved possible unique mechanisms for superconductivity whose realization might extend the range of critical parameters. These include low carrier density superconductors, selected Heavy Fermion Compounds, and Chevrel Phase superconductors. Among the low-carrier density systems were films of Lead Tellurium and mixtures of Lanthanium Sulfide. These were prepared with the idea of ultimately fabricating FET-like devices. Films of the Heavy Fermion Compounds UPt3 and UBe13 were prepared and the critical fields and proximity effects in the latter were studied. With the advent of the high-Tc materials the program shifted to their study and measurements of their time-dependent magnetization, XPS spectra, and tunneling spectra were carried out on both bulk and thin film materials.

DESCRIPTORS: (U) *SUPERCONDUCTORS, *INTERMETALLIC COMPOUNDS, *THIN FILMS, *SUPERCONDUCTIVITY, BULK MATERIALS, DENSITY, SPECTRA, TUNNELING(ELECTRONICS), TELLURIUM, MAGNETIZATION, TIME DEPENDENCE, CRITICAL

AD-A187 563

AD-A187 563 CONTINUED

TEMPERATURE, YTTRIUM COMPOUNDS, BARIUM COMPOUNDS, COPPER COMPOUNDS, OXIDES, PEROVSKITES, SINGLE CRYSTALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 562 7/2

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Atomic and Molecular Gas Phase Spectrometry.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-30 Sep 87,

87 34P

PERSONAL AUTHORS: Winefordner, J. D.

CONTRACT NO. AFOSR-86-0015

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-87-1581

UNCLASSIFIED REPORT

ABSTRACT: (U) The research involves an extensive investigation of analytical and physical aspects of gas phase spectroscopy. The goal of these studies is the development of high sensitivity, high selectivity, precise, accurate methods of analysis of elements in real samples by atomic adsorption, atomic emission, atomic fluorescence, atomic ionization, and atomic photothermal methods. The major research projects have included: evaluation of the mechanism of vaporization, atomization, excitation, and ionization of N2 molecules in the ICP; derivation of expressions to describe analytical growth curves in AFS; measurement of OH rotational population distributions in combustion flames and evaluation of the departures from thermal equilibrium; evaluation of the analytical uses of flame and furnace coherent forward scatter spectrometry using both lasers and detection methods for atomic fluorescence and atomic ionization. Keywords: Atomic spectroscopy, Analytical chemistry, Gases.

DESCRIPTORS: (U) *ANALYTICAL CHEMISTRY, *ATOMIC SPECTROSCOPY, *COMBUSTION, *VAPOR PHASES, *NITROGEN, ADSORPTION, ATOMIC PROPERTIES, DETECTION, FLAMES, GASES, HIGH SENSITIVITY, LASERS, METHODOLOGY, MOLECULES, NUCLEAR RADIATION, POPULATION(MATHEMATICS), ROTATION, SAMPLING, SPECTROMETRY, THERMAL STABILITY, VAPORIZATION.

AD-A187 562 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 559 12/5

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

(U) Theory and Practice of Fault Tolerance in Distributed Systems.

DESCRIPTIVE NOTE: Final rept. 15 Jun 85-14 Oct 86,

MAR 87 12P

PERSONAL AUTHORS: Chandy, K. M.; Misra, J.

CONTRACT NO. AFOSR-85-0252

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1462

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work has concentrated on developing a unifying framework, under the name UNITY, for studying problem solving in parallel programming independent of specific architectural considerations. We have proposed a simple model of computation and a logic to reason about properties of such programs and have managed to study problems from a variety of problem areas. We have developed a number of transformations which are appropriate for implementations on a variety of architectures: sequential, asynchronous shared memory, distributed message passing, synchronous parallel with shared memory, systolic arrays, and VLSI chips. The diversity of the application areas and the architectures studied lends credence to our hypothesis that there is a UNITY to computer programming.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *PARALLEL PROCESSING, *DISTRIBUTED DATA PROCESSING, *FAULT TOLERANT COMPUTING, COMPUTATIONS, COMPUTER ARCHITECTURE, DISTRIBUTION, FAULTS, HYPOTHESES, MEMORY DEVICES, MESSAGE PROCESSING, TOLERANCE, TRANSFORMATIONS.

IDENTIFIERS: (U) Unity project, Parallel programming, PE61102F, WUAFOSR2304A3.

AD-A187 559

AD-A187 543 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES LOKER HYDROCARBON RESEARCH INST

(U) Preparation of 1-Aryl-5-(N-aryl-N-benzoylamino) tetrazoles.

SEP 87 4P

PERSONAL AUTHORS: Ding, Yi-Xiang; Weber, William P.

CONTRACT NO. AFOSR-86-0042

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-87-1631

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Synthesis, n9 p823-824 Sep 87.

ABSTRACT: (U) We should like to report the direct formation of 1-aryl-5-(N-aryl-N-benzoylamino)tetrazoles by the solid liquid phase-transfer catalyzed (PTC) reaction of diarylcarbodiimides, aroyl chlorides, and sodium azide in toluene. With both sodium and potassium azide, in the absence of PTC catalyst the reaction gave recovered diarylcarbodiimides and aryl isocyanates. It should be noted that while there are numerous successful liquid-liquid PTC reactions, solid-liquid PTC reactions are still quite rare. Tetrabutylammonium chloride was used as the PTC catalyst. We believe that a sequence of reactions begin by migration of the ion pair to the surface of the solid sodium azide where anion exchange occurs resulting in formation of a toluene soluble tetrabutylammonium cation azide anion pair and precipitation of sodium chloride. Nucleophilic addition of azide anion to the central carbon of the carbodiimide 1 yields an amide anion which reacts with aroyl chloride 2 to give an N-aryl-N-aroyl-N-arylcarbamimidic azide and simultaneously regenerates a ion pair.

DESCRIPTORS: (U) *ARYL RADICALS, *SODIUM AZIDES, *TETRAZOLES, AMIDES, ANIONS, ISOCYANATES, CATALYSTS, IONS, PRECIPITATION, SODIUM CHLORIDE, SODIUM, SOLIDS, ION EXCHANGE, AZIDES, CARBON, POTASSIUM COMPOUNDS, SEQUENCES,

AD-A187 543

AD-A187 543 CONTINUED

TOLUENES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

AD-A187 542 7/4

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Structure and Composition of the Ag (111) Surface as a Function of Electrode Potential in Aqueous Halide Solutions,

87 18P

PERSONAL AUTHORS: Salaita, Ghaleb N.; Lu, Frank; Laguren-Davidson, Laarni; Hubbard, Arthur T.

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-87-1624

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v229 p1-17 1987.

ABSTRACT: (U) Studies by means of Auger spectroscopy, LEED and voltammetry are reported of the surface layers which were formed when a well-defined silver (111) surface was immersed into aqueous halide solutions (KF, KCl, KBr, KI) at controlled pH and electrode potential. Electrode potentials spanning the range from water reduction to silver oxidation were studied at pH 4 and 10. Surface composition (F, Cl, Br or I, O, K, and Ag) was monitored as a function of electrode potential by means of Auger spectroscopy following immersion. Strong adsorption of Cl, Br and I but not F occurred throughout most of the potential range, including simple immersion at open-circuit. Strength of adsorption of Cl and Br diminished significantly at extremely negative potentials near the solvent-reduction limit at pH 10: however, iodide was absorbed strongly at all potentials studied. Reductive desorption of Cl and Br from Ag (111) involved transfer of one electron per halogen atom in a very broad voltammetric peak spanning much of the accessible potential range.

DESCRIPTORS: (U) *ELECTRODES, *SILVER, *SURFACE PROPERTIES, *ELECTROCHEMISTRY, ADSORPTION, AUGER ELECTRON

AD-A187 542 CONTINUED

SPECTROSCOPY, ATOMS, HALOGENS, CIRCUITS, IMMERSION, REDUCTION, HALIDES, SOLUTIONS(MIXTURES), WATER, CONTROL, PH FACTOR, OXIDATION, LAYERS, SURFACES, VOLTAMMETRY, DESORPTION, IONS, ELECTRON TRANSFER.

IDENTIFIERS: (U) *Electrode potential, PE61102F, WUAFOSR2303A1.

AD-A187 538 20/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Inversion of Parabolic and Paraboloidal Projections,

APR 87 45P

PERSONAL AUTHORS: Oezbek, Ali; Levy, Bernard C.

REPORT NO. LIDS-P-1665

CONTRACT NO. AFOSR-85-0227, $NSF-ECS83-12921

MONITOR: AFOSR
TR-87-1605

UNCLASSIFIED REPORT

ABSTRACT: (U) The multidimensional inverse scattering problem for an acoustic medium is considered within the homogeneous background Born approximation. A constant density acoustic medium is probed by a wide-band plane wave source, and the scattered field is observed along a receiver array located outside the medium. The inversion problem is formulated as a generalized tomographic problem. It is shown that the observed scattered field can be appropriately filtered so as to obtain generalized projections of the scattering potential. For a 2-D experimental geometry, these projections are weighted integrals of the scattering potential over regions of parabolic support, whereas they become surface integrals over circular paraboloids for the 2-D case. The inversion problem is therefore similar to that of x-ray tomography, except that instead of being given projections of the object to be reconstructed along straight lines, parabolic or paraboloid projections are given. The inversion procedure that we propose is similar to the x-ray solution, in the sense that it consists of a backprojection operation followed by 2- or 3-D space invariant filtering. An alternative interpretation of the backprojection operation in terms of a backpropagated field is given. A Projection-Slice Theorem is also derived relating the generalized projections and the scattering potential in the Fourier transform domain.

DESCRIPTORS: (U) *INVERSE SCATTERING, *ACOUSTIC SCATTERING, ACOUSTICS, FOURIER TRANSFORMATION, INVERSION, PARABOLAS, PARABOLIC BODIES, ARRAYS, RECEIVERS, DENSITY,

AD-A187 538 CONTINUED

HOMOGENEITY, INTEGRALS, SURFACES, TOMOGRAPHY, BROADBAND, PLANE WAVES, SOURCES, X RAYS, DETECTION, TOUCH, INTEGRALS, WEIGHTING FUNCTIONS, SOLUTIONS(GENERAL), HOMOGENEITY.

AD-A187 534 12/1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF MATHEMATICS

(U) Time Delays and Boundary Feedback Stabilization in One-Dimensional Viscoelasticity. Appendices A thru H.

DESCRIPTIVE NOTE: Interim scientific rept.,

OCT 87 217P

PERSONAL AUTHORS: Hannsgen, K. B.; Wheeler, R. L.

CONTRACT NO. AFOSR-86-0085/ $NSF-DMS85-00947

MONITOR: AFOSR
TR-87-1604

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Time Delays and Boundary Feedback Stabilization in one Dimensional Viscoelasticity; Boundary control of Timoshenko Beams; Existence and Decay Estimates for Boundary Feedback Stabilization of Torsional Vibrations in a Viscoelastic Rod. Effectiveness and Robustness with Respect to Time Delays of Boundary Feedback Stabilization in one Dimensional Viscoelasticity; on the Initial Boundary Value Problem for a Bingham Fluid in a Three Dimensional Domain; Semidiscretization Method for Three Dimensional Motion of a Bingham Fluid; on Robustness of Controllability for Finite Dimensional Approximations of Distributed Parameter Systems; On the Shape of the Solutions of Second Order Parabolic Partial Differential Equations.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *TIMOSHENKO BEAM, *VISCOELASTICITY, BOUNDARIES, CONTROL, DISTRIBUTION, ONE DIMENSIONAL, PARTIAL DIFFERENTIAL EQUATIONS, MOTION, THREE DIMENSIONAL, FEEDBACK, STABILIZATION, DECAY, ESTIMATES, APPROXIMATION(MATHEMATICS), FINITE DIFFERENCE THEORY, SIZES(DIMENSIONS), DELAY, TIME INTERVALS, RODS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 526 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Novel Diethylamino Migrations in the Reaction of Diethylaminodichlorophosphine with Sodium Tetracarbonylferrate(-II),

86 5P

PERSONAL AUTHORS: King. R. B.; Wu, F.-J.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1651

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v314 pC27-C30 1986.

ABSTRACT: (U) Reaction of Et2NPC12 with Na2Fe(CO)4 1.5 dioxane in diethyl ether below 0 C gives deep orange (Et2N)2PP(Fe(CO)4(P(Fe(CO)4(OC(NEt2)Fe(CO)3, shown by X ray diffraction (monoclinic, space group P21/n; a17.071(7), b 19.117(8), c 10.853(3) Angstrum, Beta 96.82(3), Z=4 to have a four-membered FeP3 ring bonded to two isolated Fe(CO)4 groups, a four-membered FeOPC ring formed by a diethylcarbamoyl migration, but no Fe-Fe bonds. This complex undergoes facile decarbonylation in solution at room temperature to form Et2N)2PPFe(CO)4PCONEt2Fe2(CO06. Structure determination of this product by X ray diffraction (monoclinic, space group P21/n; a 9.054(4), b 38.752(34), c 19.737(8) angstrum beta 104.05(3), Z=8) indicates that this decarbonylation reaction involves conversion of a bridging diethycarbonylation group to a terminal diethycarbamoyl group, formation of an Fe-Fe bond, and formation of a new Fe-P bond.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *PHOSPHINE, *METAL CARBONYLS, *FERRATES, *AMINES, ORANGE(COLOR), ROOM TEMPERATURE, X RAY DIFFRACTION, DETERMINATION, SODIUM COMPOUNDS, CHLORINE, ETHYL RADICALS, MIGRATION, CHEMICAL BONDS.

AD-A187 526 CONTINUED

IDENTIFIERS: (U) *Diethylamino groups, Phosphine/ Diethylaminodichloro, Sodium TetraCarbonyl ferrate, Diethylcarbamoyl groups, Decarbonylation, PE61102F, WUAFOSR2303B2.

AD-A187 526

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 525 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Reactions of Dialkylaminodichlorophosphines with Tetracarbonylferrate(-II): Routes to Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Complexes,

87 5P

PERSONAL AUTHORS: King, R. B.; Wu, F.-J.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1650

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Phosphorus and Sulfur, v30 p169-172 1987.

ABSTRACT: (U) Reaction of iPr2NPCl2 with Na2Fe(CO)2 gives the phosphorus bridging carbonyl derivative (iPr2NPO2COFe2(CO)6 or the triphosphine derivative (iPr2NP)3F32(CO)6 as the major product depending upon whether the reaction is run in diethyl ether or tetrahydrofuran, respectively. Reaction of Et2NPCl2 with Na2Fe(CO)4 gives totally different types of products resulting from migration of diethylamino groups. The chemistry of these and related compounds is discussed.

DESCRIPTORS: (U) *PHOSPHINE, *CARBONYL COMPOUNDS, CHEMISTRY, FURANS, HYDROXYL RADICALS, ETHERS, ETHYL RADICALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A187 525

AD-A187 524 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) (Carbonylbis((dialkylamino)phosphido)) hexacrbonyldiiron Complexes: Migration of a Carbonyl Group from Iron to Phosphorus,

85 3P

PERSONAL AUTHORS: King, R. B.; Wu, F.-J.; Sadanani, N. D.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1653

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v24 p4449-4450 1985.

ABSTRACT: (U) This communication describes the first Fe2(CO)6 complex in which a carbonyl group bridges two phosphorus atoms. The chemistry of Fe2(CO)6 complexes includes derivatives in which a carbonyl group bridges two nitrogen atoms (e.g.(RNCONR)Fe2(CO)6, R = C6H51 and CH3) or two sulfure atoms (e.g. S2COFE2(CO)6). This communication describes the phosphorus atoms. Of particular interest is the apparent origin of this phosphorus-bridging carbonyl from a terminal carbonyl group bonded to iron. Such carbonyl migration from iron to phosphorus suggests that phosphido bridges might play an active role in metal carbonyl systems for the catalytic reduction of carbon monoxide.

DESCRIPTORS: (U) *IRON COMPOUNDS, *METAL CARBONYLS, *PHOSPHORUS, ATOMS, CARBON MONOXIDE, CATALYTIC CRACKING, IRON, REDUCTION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A187 524

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 523 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Dialkylamino Phosphorus Metal Carbonyls. 3. Heterobimetallic Mu-Phosphido Derivatives from Reactions of (Diisopropylamino)halophosphine Metal Carbonyl Complexes with Sodium Cyclopentadienyldicarbonylferrate,

86 8P

PERSONAL AUTHORS: King, R. B.; Fu, W.-K.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1654

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v25 n14 p2395-2400 1986. See also Pt. 1, AD-A187 521.

ABSTRACT: (U) The (diisopropylamino)halophosphine metal carbonyl complexes i-Pr2NP(H)XM(CO)5 (X = C1, Br; M = Cr. Mo. W) and i Pr2NP(h)C1Mn(CO)2Cp are readily by selective cleavage of one of the phosphorus nitrogen bonds in the corresponding hydrogen halide, HX. The phosphorus halogen bonds in these (diisopropylamino)halophosphine metal carbonyl complexes are potentially reactive toward nucleophiles including transition-metal nucleophiles that provide possible routes to bimetallic derivatives. This paper describes reactions of the above i-Pr2NP(H)X metal carbonyl complexes with the highly nucleophilic metal carbonyl anion C5H5Fe(CO)2 to give novel heterobimetallic complexes that may be regarded as metal carbonyl derivatives of the trivalent phosphorus ligand CpFe(CO) 2P(H)(N-i-Pr2) in which the phosphorus atom is bonded to hydrogen, nitrogen, and iron. Such complexes do not have direct metal-metal bonds but undergo facile photochemical loss of one carbonyl group to give metal metal-bonded micro-phosphido derivatives according to the general scheme (X=H,Y=N-i-Pr2).

DESCRIPTORS: (U) *HYDROGEN COMPOUNDS, *METAL CARBONYLS,

AD-A187 523

AD-A187 523 CONTINUED

*METAL COMPLEXES, *PHOSPHORUS, ATOMS, METAL METAL BONDS, IRON, NITROGEN, BONDED JOINTS, SODIUM, HYDROGEN, LOSSES, PHOTOCHEMICAL REACTIONS, TRANSITION METALS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 522 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Dialkylamino Phosphorus Metal Carbonyls. 2. Bis(diisopropylamino)phosphido and (Diisopropylamino) phosphinidene Metal Carbonyl Complexes from Reactions of Manganese and Cobalt Carbonyls with Bis(diisopropylamino)phosphine.

86 6P

PERSONAL AUTHORS: King, R. B.; Fu, W.-K.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1647

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v25 n14 p2390-2394 1986. See also Pt. 3, AD-A187 523.

ABSTRACT: (U) The previous paper of this series discussed reactions of bis(diisopropylamino)phosphine., (i-Pr2N)2PH, with the mononuclear metal carbonyl derivatives (THF)M(CO)n (n = 4, M = Fe;n = 5, M = Cr, Mo, W), (THF)Mn(CO)2Cp, and fac-(EtCN)3W-(CO)3 to give the corresponding mononuclear (i-Pr2N)2PH metal carbonyl complexes. This paper describes reactions of (i-Pr2N)2PH with the metal metal bonded binuclear metal carbonyl derivatives Mn2(CO)10 and Co2(CO)8. Such reactions follow a different course, giving the binuclear bis(diisoproplamino)phosphido metal carbonyl hydride (i-Pr2N)2PMn2(CO)8H in the case of Mn2(CO)10 and the trinuclear diisopropylaminophosphinidene metal carbonyl complex i-Pr2NPCo3(CO)9 in the case of Co2(CO)8. The structures of these two complexes have been determined by X ray diffraction.

DESCRIPTORS: (U) *METAL CARBONYLS, *PHOSPHINE, *CHEMICAL REACTIONS, METAL COMPLEXES, X RAY DIFFRACTION, MANGANESE, COBALT COMPOUNDS, METAL METAL BONDS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

AD-A187 522

AD-A187 521 7/4

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Dialkylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(diisopropylamino)phosphine with Metal Carbonyls.

86 7P

PERSONAL AUTHORS: King, R. B.; Fu, W.-K.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1648

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v25 n14 p2384-2389 1986. See also Pt. 2, AD-A187 522.

ABSTRACT: (U) Bis(diisopropylamino) phosphine, (i-Pr2N) 2PH, has recently become readily available through the LiAH4 reduction of (i-Pr2N)2PC1. Metal carbonyl complexes of (i-Pr2N)2PH are of interest because they contain potentially reactive phosphorus hydrogen and phosphorus nitrogen bonds. This paper describes a number of mononuclear (i-Pr2N)2PH metal carbonyl complexes as well as the cleavage of one or, in one case, both phosphorus nitrogen bonds in such complexes with hydrogen halides to give the corresponding metal carbonyl complexes of the ligands i-Pr2NP(H)X(X=C1,Br) and Br2PH.

DESCRIPTORS: (U) *METAL CARBONYLS, *PHOSPHINE, *CHEMICAL REACTIONS, *CHEMICAL DERIVATIVES, CLEAVAGE, NITROGEN, PHOSPHORUS, METAL CARBONYLS, METAL COMPLEXES, HYDROGEN, REACTIVITIES, CHEMICAL BONDS, HALIDES, INFRARED SPECTRA, NUCLEAR MAGNETIC RESONANCE, REPRINTS.

IDENTIFIERS: (U) Mononuclear complexes, Phosphine/ Bis(diisopropylamino), PE61102F, WUAFOSR2303B2

AD-A187 521

AD-A187 520 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Novel ((Diisopropylamino)triphosphine) hexacarbonyldiiron Complexes.

86 3P

PERSONAL AUTHORS: King, R. B.; Wu, F.-J.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1649

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v25 n11 p1733-1734 1986.

ABSTRACT: (U) An important chemical property of the triphosphine complex (i-Pr2NP)3Fe2(CO)6 is the ability to replace the diisopropylamino group on the central phosphorus atom with other groups without disturbing the diisopropylamino groups on the terminal phosphorus atoms. (Iron compounds)

DESCRIPTORS: (U) *IRON COMPOUNDS, *PHOSPHORUS, ATOMS, CHEMICAL PROPERTIES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A187 520

AD-A187 518 19/1

SRI INTERNATIONAL MENLO PARK CA

(U) New Nitration Concepts.

DESCRIPTIVE NOTE: Final rept. 1 May 86-30 Sep 87,

SEP 87 24P

PERSONAL AUTHORS: Schmitt, Robert J.; Bottaro, Jeffrey C.

CONTRACT NO. F49620-86-K-0011

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1596

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the current study was to explore the reaction of nitroacetylenes and to synthesize trinitroethyl and fluorodinitroethyl derivatives of heteroaryl aromatics. Below we summarize the results of these research areas: (1) Reactions of Nitroacetylenes. We have successfully prepared the two new cycloadducts from the reaction of a nitroacetylene with diazomethane and trimethylsilylazide: 4-nitro-5-(trimethylsilyl) triazole and 3-nitro-4-(trimethylsilyl) pyrazole. (2) Synthesis of Polynitroheteroaromatic Explosives. We have synthesized a new class of polynitroheteroaromatic explosives designed to meet Air Force mission requirements. These include N,N'-bis(trinitroethyl)-1,4-diaminotetrazene, N,N'-bis(fluorodinitroethyl)-1,4-diaminotetrazene as well as the fluorodinitro and trinitroethyl esters of 2,3-pyrazine-dicarboxylic acid, 3-4-pyridinedicarboxylic acid, and 3,5-pyridine dicarboxylic acid. Keywords: Chemistry, Synthesis, Polynitro compounds, Nitroacetylenes, Nitramines, Nitroolefins.

DESCRIPTORS: (U) *ACETYLENES, *NITRATION, *NITRO RADICALS, *SYNTHESIS, *HIGH EXPLOSIVES, AIR FORCE, AIR FORCE OPERATIONS, CHEMISTRY, ESTERS, ETHYL RADICALS, EXPLOSIVES, MILITARY REQUIREMENTS, MISSIONS, NITRAMINES, NITROGEN COMPOUNDS, POLYMERS, RESPONSE, SILICON, PYRIDINES, PYRAZOLES, SYNTHESIS(CHEMISTRY), AROMATIC

AD-A187 518

AD-A187 518 CONTINUED

COMPOUNDS.

IDENTIFIERS: (U) LPN-SRI-PYU-2099, Nitroacetylene, Cycloadducts, Diazonethane, Ozide adducts.

AD-A187 512 11/3 7/5 7/4 11/11

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Photochemical Primary Processes of Xanthene Dyes. 7. Xanthene Dyes as Probes for the Characterization of *Anionic Micelles*,

87 5P

PERSONAL AUTHORS: Fanghanel, E.; Ortman, W.; Behrmann, K.; Willscher, S.; Turro, N. J.

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1203

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 p3700-3703 1987.

ABSTRACT: (U) The cationic xanthene dyes thiopyronine and selenopyronine are solubilized in the Stern regions of anionic micelles. Upon photoexcitation, the excited triplet states of the dyes are observed to decay via unimolecular processes for the case of one dye per micelle and via bimolecular processes for the case of more than one dye per micelle. If the number of dye triplet states that undergo slow decay is measured, the number of micelles can be obtained and thus the micellar aggregation numbers can be evaluated. The aggregation numbers of several surfactant alkanesulfonates, 2,5-dialkylbenzenesulfonates with a total of 14 carbon atoms in the alkyl chains, and other detergents, which are determined in this manner, are in agreement with corresponding values determined by using other photophysical methods and with literature values. The aggregation numbers of the dialkylbenzenesulfonate surfactants increase from 38 to 56 with increasing effective chain length. The fluorescence lifetime and fluorescence depolarization of thiopyronine solubilized in the dialkylbenzenesulfonate micelles are consistent with a low local polarity and high local viscosity for the interior of these micelles, compared to micelles of

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 512 CONTINUED

aliphatic detergents. Keywords: Cationic xanthene dyes; Triplet states, Micelles; Viscosity; Fluorescence probes; Surfactants.

DESCRIPTORS: (U) *ANIONS, *COLLOIDS, *DYES, *PHOTOCHEMICAL REACTIONS, ALIPHATIC COMPOUNDS, ALKYL RADICALS, DECAY, DETERGENTS, FLUORESCENCE, HIGH VISCOSITY, LENGTH, MOLECULES, PHYSICAL PROPERTIES, POLARITY, PROBES, SURFACE ACTIVE SUBSTANCES, VISCOSITY, EXCITATION, SULFONATES, REPRINTS.

IDENTIFIERS: (U) *Xanthene dyes, Thiopyronine, Selenopyronine, Triplet states, Sulfonate/2,5, dialkylbenzene, Aggregation number, PE61102F, WUAFOSR2303B2.

AD-A187 512

AD-A187 509 7/2

DOW CHEMICAL CO MIDLAND MICH THERMAL RESEARCH LAB

(U) Evaluation and Compilation of Thermodynamic Properties of High Temperature Chemical Species.

DESCRIPTIVE NOTE: Final rept. 20 May 85-19 May 86,

AUG 87 9P

PERSONAL AUTHORS: Chase, Malcolm W.

CONTRACT NO. F49620-85-C-0076

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1420

UNCLASSIFIED REPORT

ABSTRACT: (U) This work involves a continuing effort to provide a set of critically evaluated, internally consistent, high temperature thermochemical tables; the JANAF Thermochemical Tables. During this contract period, the chemical species studied fell into three categories - alkaline earth species, alkali metal species, and elements. The species in the alkaline metal series include the metals themselves, hydroxides, halides, oxides, sulfides, sulfates and carbonates. The species in the alkali metal series include the halides and the carbonates. The elements under study include boron and aluminum. The support information gathered for the study of these chemical species has been collected together in a concise readable form and is available upon request. The calculation of the thermodynamic functions for diatomic gases was greatly enhanced by the addition of two calculational techniques. These procedures permit a more accurate accounting of the vibrational-rotational energy levels for each electronic state, including the metastable levels just above the dissociation limit. These procedures are particularly important in those cases where the electronic potential energy curve is very shallow, i.e. diatomic beryllium. Keywords: Enthalpy of formation, Entropy, Gibbs energy function, Gibbs enthalpy of formation, Heat capacity, Thermochemical tables, Enthalpy.

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AD-A187 509 CONTINUED

DESCRIPTORS: (U) *ALKALI METALS, *ALKALINE EARTH COMPOUNDS, *ALKALINE EARTH METALS, *TABLES(DATA), *THERMOCHEMISTRY, ALUMINUM, BERYLLIUM, BORON, CARBONATES, DIATOMIC MOLECULES, DISSOCIATION, ELECTRON ENERGY, ELECTRONIC STATES, ENERGY, ENTHALPY, ENTROPY, GASES, GRAPHS, HALIDES, HIGH TEMPERATURE, HYDROXIDES, METALS, METASTABLE STATE, OXIDES, POTENTIAL ENERGY, SPECIFIC HEAT, SULFATES, SULFIDES, THERMODYNAMIC PROPERTIES, THERMODYNAMICS, CHEMICAL REACTIONS, HANDBOOKS, STANDARDIZATION, DIMERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1

AD-A187 505 20/4 21/2

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Turbulence Interactions in Single- and Multi-Phase Turbulent Mixing and Combustion Processes.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

AUG 87 29P

PERSONAL AUTHORS: Faeth, G. M.; Parthasarathy, R. N.

CONTRACT NO. AFOSR-86-0248

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1475

UNCLASSIFIED REPORT

ABSTRACT: (U) Turbulent multiphase flows (particle-laden jets, particle-laden flows in ducts, sprays, etc.) have technical applications for the combustion processes of airbreathing propulsion systems, and solid and liquid rocket motors. This report describes an upgrade of a single channel laser Doppler anemometer (LDA) to provide critical measurements needed to gain a better understanding of this class of multiphase flows. The upgrade yields a system which can be configured in several ways: a phase-discriminating LDA which provides either two phase-velocity components at a single point, or phase velocities at two points which are independently transversable; and a phas-Doppler LDA which can provide two-component particle (or drop) size and velocity information at a single point. All systems can yield particle (or drop) number fluxes. The arrangement of these systems is described along with some representative results using the phase-discrimination configuration. Keywords: Dilute dispersed flows; Laser Doppler anemometry; Multiphase flow; Particle-laden jet flow.

DESCRIPTORS: (U) *COMBUSTION, *MULTIPHASE FLOW, *TURBULENT FLOW, AIR BREATHING ENGINES, PROPULSION SYSTEMS, DILUTION, DISPERSING, FLOW, DOPPLER SYSTEMS, LASER ANEMOMETERS, JET FLOW, PARTICLES, MEASUREMENT, DUCTS, ROCKET ENGINES, PHASE, VELOCITY, PARTICLE FLUX,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 505 CONTINUED

DROPS, PARTICLE SIZE, DISCRIMINATION, INTERACTIONS, TURBULENCE.

IDENTIFIERS: (U) Laser doppler anemometers, Phase discrimination, PE61102F, WUAFOSRA1.

AD-A187 504 17/7 13/13 20/2 20/1

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Research and Development of Surface Skimming Bulk Wave Devices for Sensor Applications.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-30 Jun 87,

AUG 87 90P

PERSONAL AUTHORS: Cullen, Donald E.

REPORT NO. UTRC/R87-927145

CONTRACT NO. F49620-85-C-0061

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-87-1445

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The application of surface skimming bulk wave (SSBW) technology to sensors, and to an accelerometer in particular, was investigated through further studies of the properties of the SSBW mode, and through the design, fabrication, and evaluation of a laboratory SSBW cantilever beam accelerometer. The long-term stability of the SSBW mode for devices immersed in a damping fluid was shown to be equal to the stability of vacuum sealed devices (approx. 5 ppm/year). The relevant properties of the dual delay line configuration (SSBW devices on both sides of a single substrate) were investigated. The damping of mechanical vibrations in a cantilever quartz beam was studied, establishing the fact that critical damping of the beam can be achieved without difficulty. Evaluation of SSBW accelerometer models showed that the acceleration sensitivity of these devices can be accurately predicted from theory, and that fluid damping can reduce the vibration sensitivity of the SSBW oscillator to less than 5 x 10 to the minus 8th power/G. The results of this study indicate that a practical milli-G range SSBW accelerometer can be developed.

AD-A187 505

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AD-A187 504 CONTINUED

DESCRIPTORS: (U) *ACCELEROMETERS, *CANTILEVER BEAMS, *DAMPING, *DETECTORS, *MECHANICAL PROPERTIES, *OSCILLATORS, *QUARTZ, *VACUUM APPARATUS, *WAVE PROPAGATION, ACCELERATION, DELAY LINES, FLUIDS, LONG RANGE(TIME), MODELS, SEALED SYSTEMS, SENSITIVITY, STABILITY, SUBSTRATES, SURFACES, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A187 500 12/1

OAK RIDGE NATIONAL LAB TN

(U) A Compact Row Storage Scheme for Cholesky Factors Using Elimination Trees.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

JUN 86 23P

PERSONAL AUTHORS: Liu, Joseph W.

CONTRACT NO. AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1228

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ACM Transactions on Mathematical Software, v12 n2 p127-148 Jun 86.

ABSTRACT: (U) For a given sparse symmetric positive definite matrix, a compact row-oriented storage scheme for its Cholesky factor is introduced. The scheme is based on the structure of an elimination tree defined for the given matrix. This new storage scheme has the distinct advantage of having the amount of overhead storage required for indexing always bounded by the number of nonzeros in the original matrix. The structural representation may be viewed as storing the minimal structure of the given matrix that will preserve the symbolic Cholesky factor. Experimental results on practical problems indicate that amount of savings in overhead storage can be substantial when compared with Sherman's compressed column storage scheme.

DESCRIPTORS: (U) *SPARSE MATRIX, *LINEAR SYSTEMS, COMPRESSION, ELIMINATION, REPRINTS, STORAGE, STRUCTURAL PROPERTIES, TREES, SYMMETRY, EXPERIMENTAL DATA.

IDENTIFIERS: (U) *Cholesky factorization, PE61102F, WUAFOSR2304A3

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 494 12/6

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly technical rept. 1 Jun-31 Aug 87.

AUG 87 33P

PERSONAL AUTHORS: Guha, Aloke; Natarajan, Subra; Derstine, Matthew

CONTRACT NO. F49620-86-C-0082, $$ARPA Order-5794

PROJECT NO. 5794

TASK NO. 00

MONITOR: AFOSR
TR-87-1646

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this program is to develop a concept for an optical computer architecture for symbolic computing by defining a computation model of a high level language, examining the possible devices for the ultimate construction of a processor, and by defining required optical operations. In the quarter we undertook a detailed evaluation of our optical architecture (SPARO) for combinator graph reduction. Since we had determined that the interconnection network was the bottleneck in the performance of the architecture, our focus was on the message throughput of the simple register-based network. We derived an accurate performance model for the equivalent bidirectional ring network and found that the net parallelism in the architecture was indeed restricted by the low message traffic in the network. When messages exhibit no locality, the throughput for a 1024 processor network is 27. With local messages, the maximum throughput for the same network is 27. All results were subsequently verified by limited to 8 simulations.

DESCRIPTORS: (U) *NETWORK ANALYSIS(MANAGEMENT), *COMPUTER ARCHITECTURE, *OPTICAL PROCESSING, COMPUTATIONS, HIGH LEVEL LANGUAGES, MESSAGE PROCESSING, THROUGHPUT, ELECTROOPTICS.

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AD-A187 494 CONTINUED

IDENTIFIERS: (U) SPARO(Symbolic Processing Architecture In Optics), Expert systems, SEN(Shuffle Exchange Networks), Optoelectronics, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 487 25/2 20/14

SOUTHERN METHODIST UNIV DALLAS TEX DEPT OF ELECTRICAL ENGINEERING

(U) Spread Spectrum Mobile Radio Communications.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Mar-30 Sep 87,

SEP 87 35P

PERSONAL AUTHORS: Gupta, S. C.

CONTRACT NO. AFOSR-82-0309

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR TR-87-1645

UNCLASSIFIED REPORT

ABSTRACT: (U) This report considers packet radio performance in mobile fading channels. The first chapter considers th optimal packet size for NPCSMA scheme n mobile fading channels. Here, modified expression for the channel throughput of nonpersistent carrier sense multiple access protocol (NPCSMA) in slow Nakagami fading channel is given. The optimal packet size and the acknowledgement size are obtained such that a maximum number of users can share the channel while maintaining reliable values for both the probability of packet and acknowledgement error. Meanwhile the useful throughput is also insured to be at maximum value. The second chapter considers pack radio performance over fast fading channels. Here, expressions for the throughput and packet delay of nonpersistent carrier sense multiple access (NPCSMA) protocol in fast fading environment are derived. Upper and lower bounds are obtained for a case where the fading phenomena is neither slow or fast. An alternative technique is used to approximately predict the performance for the cases that exist between these bounds. Both Nakagami fading and noncoherent reception are assumed.

DESCRIPTORS: (U) *CHANNELS, *RADIO EQUIPMENT, *FADING(ELECTROMAGNETIC WAVES), THROUGHPUT, MOBILE,

AD-A187 487

AD-A187 487 CONTINUED

PACKETS, INCOHERENCE, RECEPTION, RELIABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3.

AD-A187 473 12/2

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Boundary-Value Descriptor Systems: Well-Posedness, Reachability, and Observability,

NOV 86 47P

PERSONAL AUTHORS: Nikoukhah, Ramine; Willsky, Alan S.; Levy, Bernard C.

REPORT NO. LIDS-P-1626

CONTRACT NO. AFOSR-82-0258, $NSF-ECS83-12921

MONITOR: AFOSR TR-87-1615

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper introduces the class of two-point boundary-value descriptor systems (TPBVDS), discrete-time systems described by possibly linear dynamics and a set of boundary conditions constraining the values of the system state at the two endpoints of the system's interval of definition. By introducing a standard form for regular pencils we obtain a new and simple generalized Cayley-Hamilton theorem that simplifies our investigation of well-posedness, Green's function solution, and reachability and observability that one can define for TPBVDS, associated with processes that propagate inward from and outward toward the boundaries. We investigate each of these in detail, obtaining, among other things, far simpler forms for the reachability and observability results found previously in literature. In addition we describe several methods for the efficient solution of TPBVDS, one involving recursions from each end of the interval toward the other and two others involving recursions that proceed outward toward and inward from the boundaries.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, DISCRETE DISTRIBUTION, TIME, INTERVALS, DYNAMICS, LINEARITY, EFFICIENCY, SOLUTIONS(GENERAL), GREENS FUNCTION, BOUNDARIES.

IDENTIFIERS: (U) Cayley Hamilton Theorem, TPBVDS(Two Point Boundary Value Descriptor System).

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AD-A187 469 4/2

COLORADO STATE UNIV FORT COLLINS ENGINEERING RESEARCH CENTER

(U) ROMPEX - The Rocky Mountain Peaks Experiment of 1985: Preliminary Assessment,

APR 87

PERSONAL AUTHORS: Reiter, Elmar R.; Sheaffer, John D.; Bossert, James E.; Fleming, Richard C.; Clements, William E.

CONTRACT NO. F49620-85-C-0077

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-87-1470

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Bulletin of the American Meteorological Society, v68 n4 p321-328 Apr 87.

ABSTRACT: (U) During the late summer of 1985 a field experiment was conducted to investigate mountain top winds over a broad area of the Rocky Mountains extending from south central Wyoming through northern New Mexico. The principal purpose of this experiment was to further investigate an unexpectedly strong and potentially important wind cycle observed at mountaintop in north central Colorado during August 1984. These winds frequently exhibited nocturnal maxima of 20 to 30 m/s from southeasterly directions and often persisted for eight to ten hours. It appears that these winds originate as outflow from intense mesoscale convective systems that form daily over highland areas along the Continental Divide. However, details of the spatial extent and variability of these winds could not be determined from routine, regional weather data that are mostly collected in valleys. Although synoptic conditions during much of the 1985 experiment period did not favor diurnally recurring convection over the study area, sufficient data were obtained to verify the regional-scale organization of strong convective outflow at mountaintop elevations. In addition, the usefulness and feasibility of a mountain

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peak weather-data network for routine synoptic analysis is demonstrated. Keywords: Nocturnal winds; Convective precipitation; Complex terrain.

DESCRIPTORS: (U) *WIND, *CONVECTION(ATMOSPHERIC), TERRAIN, ATMOSPHERIC PRECIPITATION, FIELD TESTS, MOUNTAINS, NEW MEXICO, NORTH(DIRECTION), SOUTH(DIRECTION), WYOMING, DAILY OCCURRENCE, MOUNTAINS, COLORADO, METEOROLOGICAL DATA, WEATHER, SPATIAL DISTRIBUTION, SUMMER, SYNOPTIC METEOROLOGY, CYCLES, WIND.

IDENTIFIERS: (U) ROMPEX(Rocky Mountain Experiment), Rocky Mountains, Mountain top winds, Continental divide, Complex terrain.

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AD-A187 467 20/11

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) *The Dynamics of Coupled Planar Rigid Bodies. Part 1. Reduction, Equilibria and Stability,*

JUL 87 40P

PERSONAL AUTHORS: Sreenath, N.; Oh, Y. G.; Krishnaprasad, P. S.; Marsden, J. E.

CONTRACT NO. AFOSR-87-0073, $NSF-OIR85-00108

MONITOR: AFOSR TR-87-1433

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper studies the dynamics of coupled planar rigid bodies, concentrating on the case of two or three bodies coupled with a hinge joint. The Hamiltonian structure is non-canonical and is obtained using the methods of reduction, starting from canonical brackets on the cotangent bundle of the configuration space in material representation. The dynamics on the reduced space for two bodies occurs on cylinders in IR(3); stability of the equilibria is studied using the Energy-Casimir method and is confirmed numerically. The phase space of the two bodies contains a homoclinic orbit which produces chaotic solutions when the system is perturbed by a third body. This and a study of periodic orbits are discussed in part II. The number and stability of equilibria and their bifurcations for three bodies as system parameters are varied are studied here; in particular, it is found that there are always 4 or 6 equilibria.

DESCRIPTORS: (U) *HINGES, *EQUATIONS OF MOTION, COUPLING(INTERACTION), DYNAMICS, HAMILTONIAN FUNCTIONS, MATERIALS, MOUNTING BRACKETS, ORBITS, PARAMETERS, PLANAR STRUCTURES, RIGIDITY, POISSON EQUATION.

IDENTIFIERS: (U) Energy casimir method, Homoclinic orbits, Bifurcation theory.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 464 12/9 12/4

MARYLAND UNIV COLLEGE PARK

(U) Tactile Sensing ard Inverse Problems,

OCT 87 32P

PERSONAL AUTHORS: Yang, R.; Krishnaprasad, P. S.

CONTRACT NO. AFOSR-87-0073, $NSF-OIR85-00108

MONITOR: AFOSR
TR-87-1435

UNCLASSIFIED REPORT

ABSTRACT: (U) In recognizing a grasped object or grasp an object stably with a multifingered robotic hand, tactile sensors mounted on robot fingers have been identified as essential detecting tool. In general, grasp stability has two requirements: sliding avoidance and excess force avoidance. Hence, it is required that a tactile sensor be able to detect the nature of the force distribution which exists between the surface of the grasped object and the robot finger. Several kinds of tactile sensors have been designed based on electro-optics, piezoresistive, or piezoelectric properties, etc., Typically, these sensors are not used to measure the contact force directly, but to measure the interior strain or stress in an elastic finger pad. When sharp and rigid objects, e.g., a wedge indentor, indent an elastic material, very high stress is developed at the contact surface. This stress is reduced by distance from the contact area, so a fragile sensor would be better protected with a layer soft material. Another advantage of using an elastic covering is that the contact area becomes large so that grasp stability may be enhanced and the features of grasped objects better distinguished. The goal of this paper is to study how a surface force profile may be estimated from the information on strain or stress distribution detected by tactile sensors. This problem is referred to as the inverse problem since we can consider the stress or strain within an elastic material as the response due to surface loading.

DESCRIPTORS: (U) *DETECTORS, *FINGERS, *MECHANICAL COMPONENTS, *ROBOTS, *TOUCH, AVOIDANCE, DETECTION, DISTRIBUTION, ELASTIC PROPERTIES, ELECTROOPTICS, INVERSION, LAYERS, MATERIALS, PIEZOELECTRIC EFFECT,

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RANGE(DISTANCE), REQUIREMENTS, RIGIDITY, SURFACES, SHARPNESS, STRESSES, SLIDING, LOADS(FORCES), DISCRETE FOURIER TRANSFORMS, PROBLEM SOLVING.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 456 20/12 9/1 20/3

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF PHYSICS

(U) MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.

DESCRIPTIVE NOTE: Quarterly rept.,

MAR 87 23P

PERSONAL AUTHORS: Faurie, Jean-Pierre

CONTRACT NO. F49620-87-C-0021

MONITOR: AFOSR TR-87-1628

UNCLASSIFIED REPORT

ABSTRACT: (U) Results obtained for MBE grown N & P-type layers in terms of carrier concentration and electron or hole mobilities. Most layers grown after the start date of the current contract. It is important to point out that even if these results are the best ever obtained in the laboratory they are representative of our level of control concerning the growth. Numerous layers with the same composition exhibit very similar results. A new Hg cell, which is a prototype built by ISA - Riber is currently being tested in the laboratory. This cell that we have conceived gives a very stable Hg flux during hours of growth. It should be noted that both mobility and carrier concentration values are suitable for IR device application. Keywords: Mercury compounds, Cadmium Tellurides.

DESCRIPTORS: (U) *TELLURIDES, *ELECTRONIC EQUIPMENT, *CHARGE CARRIERS, ELECTRONS, GROWTH(GENERAL), CONTRACTS, PROCESSING, CONTROL.

IDENTIFIERS: (U) PE61102F.

AD-A187 456

AD-A187 454 6/4 6/1 6/5

BAYLOR COLL OF MEDICINE HOUSTON TX

(U) Mechanisms of Transmitter Release in Hippocampus: University Research Instrumentation Program.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Jun 87,

SEP 87 2P

PERSONAL AUTHORS: Johnston, Daniel

CONTRACT NO. AFOSR-86-0214

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR TR-87-1431

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant was for the purchase of equipment to establish a subcellular fractionation and patch clamping facility at Baylor College of Medicine. Experiments involve the isolation of an enriched fraction of mossy fiber synaptic terminals from adult rats. We have been investigating mechanisms of transmitter release, using biochemical and electrophysiological techniques. We have used the centrifuges successfully to develop this preparation of enriched mossy fiber synaptosomes. The computer, microscope, and isolation table are in use as a patch clamping facility to study the electrophysiological properties of these terminals. We have successfully measured the potassium stimulated and calcium dependent release of endogenous glutamate from these terminals. We have found that several phorbol esters are able to potentiate this release of glutamate, and we are in the process of investigating the mechanisms underlying this enhanced release. Our patch clamping has met with only limited success thus far. Although we have shown that the technique can be successfully applied to these small terminals, we have yet to make recordings of single calcium channels. The channels recorded thus far appear to be nonselective cation channels. We are currently in the process of altering our procedures and are hopeful that this aspect of the project will meet with more success in the very near future.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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DESCRIPTORS: (U) *HIPPOCAMPUS, *NERVE TRANSMISSION, *NEUROCHEMISTRY, ADULTS, BIOCHEMISTRY, CALCIUM, CELLS(BIOLOGY), CENTRIFUGES, CHANNELS, ELECTROPHYSIOLOGY, ESTERS, FACILITIES, FIBERS, FRACTIONATION, GLUTAMIC ACID, INSTRUMENTATION, ISOLATION, MEDICINE, METHODOLOGY, PROCUREMENT, RATS, RELEASE, SALTS, SYNAPSE, TERMINALS, UNIVERSITIES, REACTION KINETICS.

IDENTIFIERS: (U) Mossy fiber synaptosomes, Synaptosomes, Patch clamping, Synaptic terminals, Glutamate, PE61102F, WUAFOSR2917A4.

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AD-A187 453 11/6.2 7/4 9/1

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Electrodeposition of Pb onto Pt(111) in Aqueous Chloride Solutions,

86 16P

PERSONAL AUTHORS: Schardt, Bruce C.; Stickney, John L.; Stern, Donald A.; Wieckowski, Andrzej; Zapien, Donald C

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1597

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v175 p520-534 1986.

ABSTRACT: (U) Studies by LEED and Auger spectroscopy of Lead electrodeposited from aqueous HydroChloric Acid solutions onto well-defined Platinum surfaces are reported. Adsorption of HCl from pure aqueous HCl solutions (PH=0to4) onto Pt(111) at electrode potentials from 0.4 to 0.8 volt (versus AgCl reference electrode) resulted in a stable (3x3) adlattice; however, below 0.4 volt adsorption was weak and desorption occurred readily under the influence of the electron beams employed for LEED or Auger spectroscopy. When Pb ions were present in the chloride solution, spontaneous (open circuit) electrodeposition of Pb occurred altering the sizes, shapes, and intensities of beams in the (3x3) pattern. Electrodeposition of Lead under conditions of negative linear potential scan resulted in a series of ten peaks at potentials more positive than the peak for deposition of bulk Pb. LEED patterns obtained after emersion of the surface at various stages during the scan revealed that the electrodeposited layer was ordered and underwent a series of structural transitions with increasing Pb coverage. Comparison of the Auger signal for Pb with the coulometric charge for Pb deposition demonstrated that the Pb deposit was not stable at open circuit (as in emersion). The Auger signal for Cl was not generally

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attenuated by deposition of Pb, indicating that Cl was present in the topmost layer of the surface at all Pb coverages.

DESCRIPTORS: (U) *ELECTRODEPOSITION, *ELECTRODES, *PLATINUM, *LEAD(METAL), ACIDS, ADSORPTION, AUGER ELECTRON SPECTROSCOPY, CHLORIDES, DEPOSITION, DESORPTION, ELECTRON BEAMS, IONS, LAYERS, LINE SCANNING, SOLUTIONS(MIXTURES), SURFACES, CRYSTALLOGRAPHY, INTERFACIAL TENSION, ELECTROLYSIS.

IDENTIFIERS: (U) LEED(Low Energy Electron Diffraction), PE61102F, WUAFOSR2303A1.

AD-A187 452 12/3 2/4

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Diagnostics and Robust Estimation When Transforming the Regression Model and the Response.

DESCRIPTIVE NOTE: Journal article,

AUG 87 14P

PERSONAL AUTHORS: Carroll, R. J.; Ruppert, David

CONTRACT NO. F49620-85-C-0144, $NSF-DMS84-00602

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1598

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Technometrics, v29 n3 p287-299 Aug 87.

ABSTRACT: (U) In regression analysis, the response is often transformed to remove heteroscedasticity and/or skewness. When a model already exists for the untransformed response, then it can be preserved by applying the same transform to both the model and the response. This methodology, which is called transform both sides, has been applied in several recent papers and appears highly useful in practice. When a parametric transformation family such as the power transformations is used, then the transformation can be estimated by maximum likelihood. The maximum likelihood estimator, however, is very sensitive to outliers. This article proposes diagnostics to indicate cases influential for the transformation or regression parameters. Also proposed is a robust bounded-influence estimator similar to the Krasker-Welsch regression estimator. Keywords: Reprints; Nonlinear models; Covariance matrix; Fisheries analysis.

DESCRIPTORS: (U) *FISHERIES, *REGRESSION ANALYSIS, ESTIMATES, MAXIMUM LIKELIHOOD ESTIMATION, TRANSFORMATIONS, MATHEMATICAL MODELS, REGRESSION ANALYSIS, REPRINTS, NONLINEAR SYSTEMS, WEIGHTING FUNCTIONS, COVARIANCE,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 452 CONTINUED

MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Robust procedures, Skewness, Hetroscedasticity, PE61102F, WAUFOSR2304A5.

AD-A187 451 12/2

MARYLAND UNIV COLLEGE PARK

(U) On an Overdetermined Neumann Problem,

JUL 87 7P

PERSONAL AUTHORS: Bernstein, Carlos A.

CONTRACT NO. AFOSR-87-0073

MONITOR: AFOSR
TR-87-1442

UNCLASSIFIED REPORT

ABSTRACT: (U) Several questions in harmonic analysis, partial differential equations and applied mathematics lead to the question of characterizing domains for which overdetermined boundary value problems have solutions. Theorem Let M = R superscript n (resp. H superscript n), the existence of infinitely many eigenvalues for either of the problems (D) or (N) characterizes the balls (resp. geodesic balls) among all the relatively compact domains omega with connected Lipshitz boundary.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *EIGENVALUES, APPLIED MATHEMATICS, HARMONIC ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) Overdetermined Neumann Problem.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 436 12/4

MARYLAND UNIV COLLEGE PARK

(U) Nonlinear Filtering and Large Deviations: A PDE-Control Theoretic Approach.

FEB 87 22P

PERSONAL AUTHORS: James, M. R.; Baras, J. S.

CONTRACT NO. AFOSR-87-0073, $NSF-CDR85-00108

MONITOR: AFOSR TR-87-1438

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider the asymptotic nonlinear filtering problem dx = f(x) dt + sq. rt. epsilon, dy = h(x) dt + sq. rt. epsilon, and obtain the limit as epsilon approaches 0 of epsilon log (q(xt) to the epsilon power) = - W(x, t) for unnormalised conditional densities (q(x,t)) to the epsilon power, using PDE methods. Here, W(x,t) is the value function for a deterministic optimal control problem arising in Mortensen's deterministic estimation, and is the unique viscosity solution of a Hamilton-Jacobi- Bellman equation. Hijab has also studied this filtering problem, and we extend his large deviation result for certain unnormalised conditional measures. The resulting variational problem corresponds to the above control problem.

DESCRIPTORS: (U) *CONTROL THEORY, *NONLINEAR SYSTEMS, DETERMINANTS(MATHEMATICS), ESTIMATES, ELECTRONS, FILTERS, SOLUTIONS(GENERAL), VISCOSITY, CYCLOTRON RESONANCE, CONTROL, DETERMINATION, OPTIMIZATION, EQUATIONS, ELECTRON GAS, TWO DIMENSIONAL, PROBABILITY DENSITY FUNCTIONS, VARIATIONAL METHODS, ASYMPTOTIC SERIES.

IDENTIFIERS: (U) Hamilton Jacobi Bellman equation, Mortensen estimation, *Nonlinear filtering.

AD-A187 435 25/5

MARYLAND UNIV COLLEGE PARK

(U) Local Bifurcation Control,

87 29P

PERSONAL AUTHORS: Abed, Eyad H.

CONTRACT NO. AFOSR-87-0073, $NSF-CDR85-00108

MONITOR: AFOSR TR-87-1443

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-ECS84-04275.

ABSTRACT: (U) Local feedback stabilization of bifurcated solution branches is studied. Two cases are considered: that in which the nominal system undergoes a Hopf bifurcation as a parameter is varied, and the case of a stationary bifurcation from a simple zero eigenvalue. For each case, results on the existence of a stabilizing feedback are given, Moreover, simple synthesis techniques for the stabilizing controllers are discussed. A concept of proximity stabilization is introduced as an alternative to stabilization in the ordinary sense for systems that are not locally stabilizable. A result is stated on the genericity of proximity stabilizability. Motivation for further research in several areas is given. Keywords: Control systems; Electrical engineering.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *FEEDBACK, *STABILIZATION, ELECTRICAL ENGINEERING, MOTIVATION, PROXIMITY DEVICES, SOLUTIONS(GENERAL), SYNTHESIS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 430 12/1

MARYLAND UNIV COLLEGE PARK

(U) On Observer Problems for Systems Governed by Partial Differential Equations,

JUL 87 22P

PERSONAL AUTHORS: Baras, J. S.; Bensoussan, A.

CONTRACT NO. AFOSR-87-0073, NSF-ECS82-19123

MONITOR: AFOSR TR-87-1440

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of observers has been introduced in the control literature by Luenberger. Let us consider a dynamic system which is deterministic, but whose initial state is unknown. An observer is a model which mimics the behavior of the physical system, and in particular its state becomes closer and closer as time evolves to the state of physical system. There is a great deal of freedom in such a design and it is important to investigate various kinds of observers.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *MATHEMATICAL MODELS, DYNAMICS, OBSERVERS, PHYSICAL PROPERTIES, SYSTEMS ANALYSIS.

AD-A187 430

AD-A187 417 9/3

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.

DESCRIPTIVE NOTE: *Final rept. 1 Jul 84-30 Jun 87,*

JUN 87 108P

PERSONAL AUTHORS: Lee, Chi H.; Ho, P. T.

CONTRACT NO. AFOSR-84-0238

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-87-1583

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress to date is summarized as follows: 1. Experimental confirmation has been made of the pulse formation mechanism in a laser modelocked by a slow saturable absorber as proposed by New and Haus. 2. We have shown analytically and experimentally that the degree of coherence is the same in a diode laser whether modelocked or singlemode at the same power. 3. The continuously operating phosphate Nd:glass laser has been modelocked for the first time ever to generate 7 ps pulses. We have also successfully amplified these pulses to J/pulse at 500 Hz rate. Keywords: Neodymium lasers; Pulsed lasers; Photoconductivity; Optoelectronic devices; Nitrogen laser; Low energy lasers.

DESCRIPTORS: (U) *LASERS, *SIGNAL PROCESSING, COHERENCE, DIODES, ELECTROOPTICS, GLASS LASERS, HIGH RATE, LOW ENERGY, NEODYMIUM LASERS, NITROGEN LASERS, PHOSPHATES, PHOTOCONDUCTIVITY, PULSED LASERS, PULSES, SOURCES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A187 417

AD-A187 416 20/2 7/2 7/4

CHICAGO UNIV ILL DEPT OF PHYSICS

(U) MBE (Molecular Beam Epitaxial) Growth Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.

DESCRIPTIVE NOTE: Quarterly rept,

JUN 87 24P

PERSONAL AUTHORS: Faurie, Jean-Pierre

CONTRACT NO. F49620-87-C-0021

MONITOR: AFOSR TR-87-1629

UNCLASSIFIED REPORT

ABSTRACT: (U) As the MBE growth technique has continued to improve for Hg(1-x)Cd(x)Te films, the prospects for films of larger area have begun to be explored. These larger area films are important for imaging arrays and will be especially vital in the future for the efficient production of Hg(1-x)Cd(x)Te material. The growth of MBE of uniform Hg(1-x)Cd(x)Te epilayer on a large substrate is very difficult to achieve because of the non-uniform distribution of the fluxes and on the non-uniform temperature of the substrate. Keywords: Molecular Beam Epitaxial(MBE); Mercury; Cadmium; Tellurium.

DESCRIPTORS: (U) *ELECTRONIC EQUIPMENT, *MERCURY, *MOLECULAR BEAMS, *MERCURY COMPOUNDS, *CADMIUM TELLURIDES, ARRAYS, CADMIUM, DISTRIBUTION, EFFICIENCY, FILMS, IMAGES, NONUNIFORM, PROCESSING, PRODUCTION, SUBSTRATES, TELLURIUM, TEMPERATURE.

AD-A187 396 12/6 12/3

GEORGIA UNIV ATHENS DEPT OF STATISTICS AND COMPUTER SCIENCE

(U) Applied Probability Statistical Methodology and Computational Statistics.

DESCRIPTIVE NOTE: Final rept. 28 Feb 85-27 Feb 86,

OCT 86 27P

PERSONAL AUTHORS: Bradley, Ralph

CONTRACT NO. AFOSR-85-0161

PROJECT NO. 2304

MONITOR. AFOSR TR-87-1410

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report form the Department of Statistics, University of Georgia, concerns the above referenced grant, an equipment grant that provided partial funding for the acquisition of specified computing equipment to support research in the department. The report is in three parts headed Equipment Acquired, Research Supported, and Department Progress. In discussion of the equipment acquired, summaries of purchases made and proposed intended purchases are provided. These summaries are supplemented by comments on equipment changes and a few notes on difficulties encountered. Summaries of computer equipment use are provided under research supported; subsections deal with research described in the proposal, other departmental research, and future research benefits. Finally, changes have occurred in the department and these are noted in a final section. Keywords: Block designs; Parameter estimates; Reliability models; Nonparametric Functions estimates; Statistical inference; Stochastic processes.

DESCRIPTORS: (U) *STATISTICS, *PROCUREMENT, *DATA PROCESSING EQUIPMENT, COMPUTATIONS, MODELS, RELIABILITY, STOCHASTIC PROCESSES, METHODOLOGY, PROBABILITY, COMPUTERS, ESTIMATES, STATISTICAL INFERENCE, NONPARAMETRIC STATISTICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304.

AD-A187 396

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 391 20/9 14/4 12/3

AD-A187 391 CONTINUED

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Error Modeling and Confidence Interval Estimation for Inductively Coupled Plasma Calibration Curves.

JUL 87 6P

PERSONAL AUTHORS: Watters, Robert L., Jr.; Carroll, Raymond J.; Spiegelman, Clifford H.

CONTRACT NO. F49620-85-C-0114

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1145

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v59 n13 p1639-1643, 1 Jul 87.

ABSTRACT: (U) A simple linear calibration function can be used over a wide concentration range for the inductively coupled plasma (ICP) spectrometer due to its linear response. The random errors over wide concentration ranges are not constant, and constant variance regression should not be used to estimate the calibration function. Weighted regression techniques are appropriate if the proper weights can be obtained. Use of the calibration curve to estimate the concentration of one or more unknown samples is straightforward, but confidence interval estimation for multiple use of of the calibration curve is less obvious. We describe a method for modeling the error along the ICP calibration curve fit. Multiple and single-use confidence curve are compared.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, *PLASMAS(PHYSICS), *SPECTROMETERS, *CURVE FITTING, CALIBRATION, CURVED PROFILES, VARIATIONS, COUPLING(INTERACTION), LINEARITY, RESPONSE, ERRORS, CURVED PROFILES, ESTIMATES, CONFIDENCE LIMITS, REPRINTS, ERROR ANALYSIS, SPECTROMETERS, FUNCTIONS(MATHEMATICS), LINEAR SYSTEMS, REGRESSION ANALYSIS, WEIGHTING FUNCTIONS.

IDENTIFIERS: (U) Inductively coupled plasmas, Heteroscedasticity, WAUFOSR2304A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 390 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Energy Separation in a Vortex Street,

87 34P

PERSONAL AUTHORS: Kurosaka, M.; Gertz, J. B.; Graham, J. E.; Goodman, J. R.; Sundaram, P.

CONTRACT NO. AFOSR-83-0049

MONITOR: AFOSR TR-87-1444

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluid Mechanics, v178 p1-29 1987. Original contains color plates: All DTIC reproductions will be in black and white.

ABSTRACT: (U) Drawing upon a combination of the experimental, theoretical and computational methods to investigate the cause and mechanism of the Eckert-Weise effect. Acoustic resonance established experimentally that the vortex street is indeed the cause. Through the theoretical and computational investigations, the dynamical mechanism for the instantaneous T sub t separation around vortices, which is the root of the effect but hidden in the time-average, is considered. The mechanism comprises three key ingredients: (i) the low-pressure fields at the vortex centres, (ii) their convective movement, amd (iii) the entrainment of fluid particles by vortices into the wake and their ejection out of it. The unsteady change in T sub t as encountered by a fluid particle along its path may duly be regarded as a natural compressor-turbine process (for an interesting interpretation of the T sub t change in turbomachines viewed solely from the unsteady equation. For a low subsonic Mach number, P sub t is predicted to become separated in a manner similar to T sub t. Thus the well-known defect of the time-averaged P sub t behind a bluff body may be re-interpreted as the super position of unsteadily separated structures. The instantaneous T sub t and P sub t separation, not limited to the vortex street, should be present even in such three-dimensional vortical flows as the large-scale structure along the periphery of jets.

AD-A187 390

AD-A187 390 CONTINUED

DESCRIPTORS: (U) *ACOUSTIC RESONANCE, *BLUNT BODIES, *VORTEX SHEDDING, NUMERICAL METHODS AND PROCEDURES, DYNAMICS, FLUIDS, PARTICLES, MACH NUMBER, SUBSONIC CHARACTERISTICS, REPRINTS, ENERGY, FLUIDS, PARTICLES, LOW PRESSURE, THREE DIMENSIONAL FLOW, ENTRAINMENT, FLOW SEPARATION, TURBOMACHINERY, WAKE, DEFECTS(MATERIALS), THEORY.

IDENTIFIERS: (U) Vortex streets, Eckert Weise effect.

DTIC REPORT BIBLIOGRAPHY

AD-A187 388 1/1 12/1

PITTSBURGH UNIV PA INST FOR COMPUTATIONAL MATHEMATICS AND APPLICATIONS

(U) Numerical Simulation of Confined Unsteady Aerodynamical Flows.

87 19P

PERSONAL AUTHORS: Frey, A.; Hall, C.; Porsching, T.

CONTRACT NO. AFOSR-84-0131

MONITOR: AFOSR TR-87-1491

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. for Numerical Methods in Engineering, v24 p1233-1250 1987.

ABSTRACT: (U) A system of algorithms is presented for the computer simulation of confined unsteady flows of a compressible fluid. The methods are valid for a wide range of time scales and are applied to simulate wind tunnel acoustics, flow over a ramp and flow past aircraft cavities. (Reprints)

DESCRIPTORS: (U) *UNSTEADY FLOW, ACOUSTICS, AIRCRAFT, ALGORITHMS, CAVITIES, COMPRESSIVE PROPERTIES, COMPUTERIZED SIMULATION, CONFINEMENT(GENERAL), FLUIDS, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, RAMPS, RANGE(EXTREMES), REPRINTS, SCALE, TIME, WIND TUNNELS, COMPRESSIBLE FLOW, DYNAMIC RESPONSE, FINITE DIFFERENCE THEORY.

IDENTIFIERS: (U) ALGAE(Algorithms for Gas Equations).

AD-A187 388

SEARCH CONTROL NO. EVJ50D

AD-A187 358 7/3

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Preparation and Characterization of Tris(Trimethylsilyl)silyl Derivatives of Zinc, Cadmium, and Mercury. X-Ray Crystal Structure of Zn(Si(SiMe3)3)2.

87 5P

PERSONAL AUTHORS: Arnold, John; Tilley, T. D.; Rheingold, Arnold L.; Geib, Steven J.

CONTRACT NO. AFOSR-85-0228

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1471

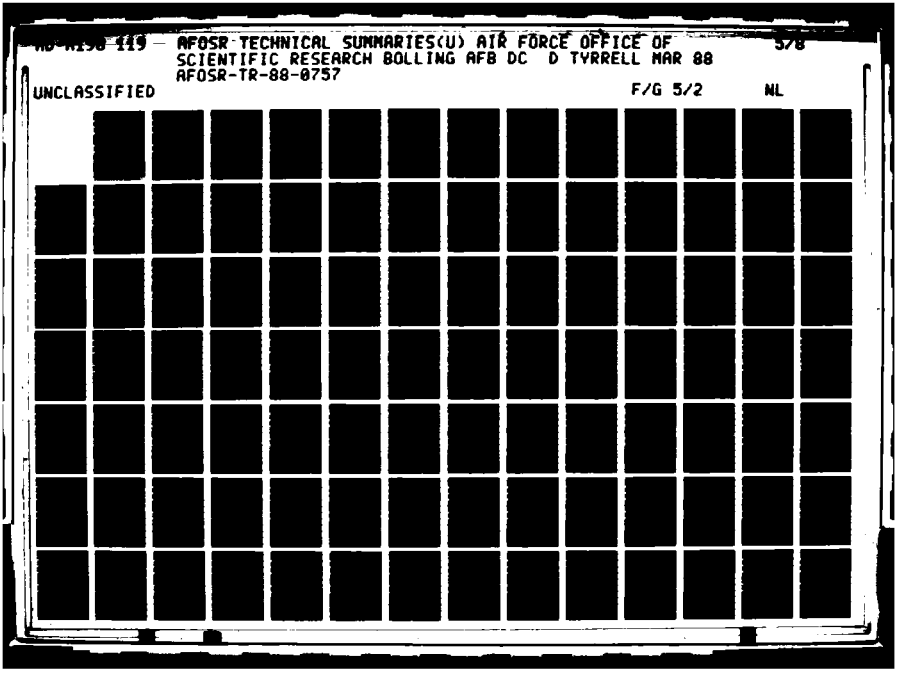
UNCLASSIFIED REPORT

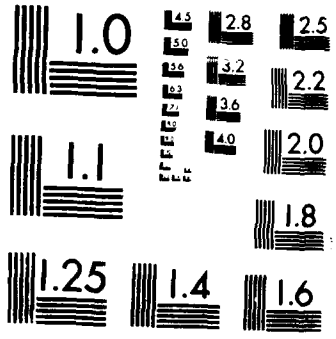
SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v26 n13 p2106-2109 1987.

ABSTRACT: (U) Complexes containing bonds between silicon and a group 12 metal have been known for many years. Recently, the isolation of thermally unstable zinc and cadmium derivatives completed the family of binary silyls M(SiMe3)2(M = Zn, Cd, Hg). Apart from Hg(SiMe3)2, which has been shown to be a useful silylating reagent, the reactivity of zinc, cadmium, and mercury silyl derivatives has not been extensively investigated. Our studies of transition-metal-silicon chemistry have prompted us to search for new silylating agents. In particular, we have sought new methods for introducing the sterically hindered -Si(SiMe3)3 ligand into the coordination sphere of high-valent, coordinatively unsaturated metal complexes. The lithium silyl (THF)3LiSi(SiMe3)3 can be used to silylate some metal halides, but in many cases decomposition resulting from reduction of the metal center is observed.

DESCRIPTORS: (U) *CADMIUM, *MERCURY, *METAL COMPOUNDS, *SILICON, *SILANES, CHEMICAL AGENTS, CRYSTAL STRUCTURE, DECOMPOSITION, HALIDES, ISOLATION, LITHIUM, METALS, THERMAL INSTABILITY, X RAYS, ZINC, REPRINTS.

AD-A187 358


AD-A196 419 AFOSR TECHNICAL SUMMARIES(U) AIR FORCE OFFICE OF
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AD-A187 358 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR230332.

AD-A187 338 20/4

AEROMETRICS INC MOUNTAIN VIEW CA

(U) Diagnostics for Research in Atomization and Turbulent Two-Phase Flows.

DESCRIPTIVE NOTE: Annual rept. 31 Jul 86-31 Jul 87,

JUL 87 17P

PERSONAL AUTHORS: Bachalo, William D.

CONTRACT NO. F49620-86-C-0078

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-1417

UNCLASSIFIED REPORT

ABSTRACT: (U) Innovative techniques for obtaining particle size and velocity are being investigated. The four methods are: phase Doppler, ratiometric light scatter detection, Lagrangian frame particle analyzer, and scattered light heterodyne interferometry. Although these methods have overlapping capabilities, each offers additional possibilities for providing heretofore unavailable data. The phase Doppler method has been highly refined and provides reliable particle size and velocity measurements. However, research has been required on the light scattering mechanisms due to nonuniform-light scattering theory and experimental observations have required the expansion of the theory to include the affects of nonuniform illumination. Under certain conditions, the detection of refracted light where none is predicted, remains as a question to be resolved. These questions apply to all of the methods addressed. However, the ratiometric techniques may be used in the on-axis forward scatter light detection mode. This will allow the measurement of irregular-shaped particles moving at high speed using light configuration, the system is limited to dilute particle fields. Currently, the theoretical analysis and optical configuration have been completed and preliminary tests have shown that the basic concept will work. Interests in turbulent dispersion of spray drops suggested the need

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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for measuring the particle dynamics in a Lagrangian frame. The method described promises to provide tracking of individual drops and measuring their local size and velocity. Array detectors are being investigated to provide adequate speed, sensitivity, and spatial resolution. The transmitter optics have been defined.

DESCRIPTORS: (U) *DYNAMICS, *TURBULENT FLOW, *TWO PHASE FLOW, ANALYZERS, ARRAYS, ATOMIZATION, DETECTION, DETECTORS, DILUTION, DISPERSING, DOPPLER SYSTEMS, DROPS, EXPANSION, FRAMES, HETERODYNING, ILLUMINATION, INTERFEROMETRY, LAGRANGIAN FUNCTIONS, LIGHT, LIGHT SCATTERING, MEASUREMENT, NONUNIFORM, OPTICAL PROPERTIES, OPTICS, PARTICLE SIZE, PARTICLES, RELIABILITY, RESOLUTION, SIZES(DIMENSIONS), SPATIAL DISTRIBUTION, SPRAYS, THEORY, TRACKING, TRANSMITTERS, TURBULENCE, VELOCITY.

IDENTIFIERS: (U) WUAFOSR2308A3, PE61102F.

AD-A187 338

AD-A187 337 13/3 16/1

S-CUBED LA JOLLA CA

(U) Development of Advanced Constitutive Models for Plain and Reinforced Concrete.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 86-28 Feb 87, MAR 87

PERSONAL AUTHORS: Hegemier, G. A.; Read, H. E.; Valanis, K. C.; Murakami, H.

REPORT NO. SSS-R-87-8454

CONTRACT NO. F49620-84-C-0029

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR TR-87-1391

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research conducted by S-Cubed to develop advance constitutive models of plain and reinforced concrete for ultimate use in the cost-effective design and hardness assessment fo concrete protective structures. The specific goals of the research are: (1) developement of a mixture theory which can accurately account for steel-concrete interaction and (2) formulation of an advanced constitutive theory for plain concrete which can accurately portray its nonlinear, inelastic behavior including damage and microcracking for arbitrary loading histories. The importance of the steel-concrete interaction and the nonlinear inelastic behavior of the palin concrete, including cracking, is emphasized. Keywords: Concrete failure modes; Continuous damage model; Dowel action; Evolution equation; Endochronic theory.

DESCRIPTORS: (U) *CONCRETE, *FAILURE(MECHANICS), COST EFFECTIVENESS, CRACKS, ELASTIC PROPERTIES, EQUATIONS, HARDNESS, INTERACTIONS, MIXTURES, MODELS, NONLINEAR SYSTEMS, PROTECTION, REINFORCED CONCRETE, STRUCTURES, STEEL, STRESS CONCENTRATION, GUIDED MISSILE SILOS, HARDENED STRUCTURES, STRESS STRAIN RELATIONS.

AD-A187 337

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IDENTIFIERS: (U) Deformation, Compressive properties, WUAFOSR2302C2, PE61102F.

AD-A187 336 9/3 20/15 21/6

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MECHANICAL ENGINEERING AERONAUTIC AL ENGINEERING AND MECHANICS

(U) Advanced Energy Conversion Concept for Beamed-Energy Propulsion.

DESCRIPTIVE NOTE: Final rept. Sep 84-Nov 86,

AUG 87 197P

PERSONAL AUTHORS: Myrabo, Leik N.

REPORT NO. RPI-5-24170

CONTRACT NO. AFOSR-84-0361

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1387

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this study was to perform basic research investigations into an innovative power conversion concept for trans atmospheric, beamed energy propulsion: a new class of External Surface Impulse (ESI) thrusters. This advanced thruster principle could be used for atmospheric VTOL, high acceleration, and lateral flight (e.g., short-term cruise) propulsion of Single-Stage-To-Orbit (SSTO) beam-powered shuttlecraft of the next century. Three classes of ESI thrusters were initially examined: 1) simple thermal, 2) electrostatic and 3) electromagnetic. Beam power wavelengths from 10cm (microwave) to 0.3um (laser) were considered. The subsequent research effort concentrated on the simple thermal repetitively-pulsed ESI thrusters, energized with laser power and using air as the working fluid. Laser frequencies were selected because of the relative wealth of experimental data and theoretical research on laser impulse coupling which exists in the literature. The first year analytical effort has proven conclusively that such an engine can deliver high levels of thrust-to-beam-power at liftoff (e.g., at least an order-of-magnitude greater than beam-powered hydrogen-fueled rockets), with infinite specific impulse (decreased only, perhaps, by

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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ablation of the thruster surface). Later along an orbital trajectory, the primary propulsion function would transition tc other modes; upon leaving the atmosphere, the SSTO vehicle would continue in a pure rocket mode with a specific impulse (I sp) of 1000 seconds or more. Keywords: Advanced airbreathing propulsion, Beamed energy propulsion, External radiation heated (EH) thruster.

DESCRIPTORS: (U) *ENERGY, *LASERS, *PROPULSION SYSTEMS, *THRUSTERS, ABLATION, AIR BREATHING ENGINES, CONVERSION, COUPLING(INTERACTION), ENERGY CONVERSION, EXPERIMENTAL DATA, EXTERNAL, FLUIDS, FREQUENCY, ORBITS, POWER, PULSES, PURITY, RADIATION, ROCKETS, SHORT RANGE(TIME), SPECIFIC IMPULSE, STAGING, SURFACES, TRAJECTORIES.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F.

AD-A187 336

AD-A187 335 13/8 20/12

IOWA STATE UNIV AMES MICROELECTRONICS RESEARCH CENTER

(U) Synthesis and Characterization of Thin Films.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-30 Nov 86,

JUL 87 371P

PERSONAL AUTHORS: Lakin, K. M.

CONTRACT NO. AFOSR-84-0388

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR
TR-87-1393

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes a program which involved the installation of the individual systems of a major thin film facility and the results of initial film growth studies using the facility. Work in the growth of aluminum and germanium on silicon, germanium on gallium arsenide, and lithium niobate on silicon and sapphire is reported. Keywords: Thin films, Depositions, Ionized cluster beam deposition; LiNbO3 films, Ellipsometry.

DESCRIPTORS: (U) *DEPOSITION, *THIN FILMS, *VACUUM DEPOSITION, FILMS, GROWTH(GENERAL), GERMANIUM, SILICON, CLUSTERING, IONIZATION, SAPPHIRE, THESES, ELLIPSOMETERS, GALLIUM ARSENIDES, ALUMINUM, LITHIUM NIOBATES, SYNTHESIS, SPUTTERING, AUGER ELECTRON SPECTROSCOPY, ULTRAHIGH VACUUM, ELECTRON DIFFRACTION.

IDENTIFIERS: (U) ICB(Ionized Cluster Beams), WUAFOSR2306132, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 334 20/4

VON KARMAN INST FOR FLUID DYNAMICS RHODE-SAINT-GENESE (BELGIUM)

(U) Velocity Measurements in a 3D (Three Dimensional) Shock Wave Laminar Boundary Layer Interaction.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-31 Jul 86,

JUL 87 46P

PERSONAL AUTHORS: Degrez, G.; Ginoux, J. J.

REPORT NO. VKI-CR8734AR

CONTRACT NO. AFOSR-83-0273

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-87-1388

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental investigation of the three dimensional laminar boundary layer separation associated with an incident swept shock wave was conducted in the von Karman Institute (VKI) S-1 supersonic wind tunnel operating at Mach 2.15. Mean velocity profiles were measured both in the attached separated and reattachment flow regions using a laser doppler velocimeter. A comparison of the measurements with a full 3D Navier-Stokes solver, developed at the VKI, exhibited good agreement in all three regions, thus validating the code which was based on the Beam-Warming algorithm. The report also reviews the earlier parts of the grant dealing with the necessary developments in LDV to achieve high quality data, and the of the 2D shock boundary layer interaction. Keywords: Two dimensional flow; Three dimensional flow; Laminar boundary layer; Flow separation.

DESCRIPTORS: (U) *LAMINAR BOUNDARY LAYER, *SHOCK WAVES, BELGIUM, MEAN, PROFILES, VELOCITY, TWO DIMENSIONAL FLOW, FLOW SEPARATION, DOPPLER SYSTEMS, LASER VELOCIMETERS, INTERACTIONS, VISCOUS FLOW, COMPRESSIBLE FLOW, NAVIER STOKES EQUATIONS.

AD-A187 334 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

AD-A187 329 4/2 8/12

UTAH UNIV SALT LAKE CITY DEPT OF METEOROLOGY

(U) A New Horizontal Gradient, Continuous Flow, Ice Thermal Diffusion Chamber.

DESCRIPTIVE NOTE: Final rept .

DEC 85

PERSONAL AUTHORS: Tomlinson, E. M.; Fukuta, N.

CONTRACT NO. AFOSR-86-0002

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-87-0651

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Atmospheric and Oceanic Technology, v2 n4 p448-467 Dec 85.

ABSTRACT: (U) A continuous-flow, horizontal gradient, ice thermal diffusion chamber has been developed and tested for heterogeneous ice nucleation of aerosol particles under accurately controlled supersaturations and supercooling in the absence of a substrate. The chamber consists of preprocessing, main and crystal settling sections. In the preprocessing and main sections, top and bottom plates are coated with clear, smooth ice by a new method. The main section maintains a range of supersaturations across the sample flow. Sample air is sandwiched with filtered and predried air to avoid wall effects and transient supersaturations. Nucleated crystals are received on Mylar copy film in the settling section and processed for analysis based on their temperatures and supersaturations at nucleation. Two numerical models are developed and used to evaluate transient supersaturation development in the shear flow and wall effects in the vertical plane across the flow. Stability of sample flow is confirmed with smoke tests.

DESCRIPTORS: (U) *ICE FORMATION, AEROSOLS, PARTICLES, FLOW, GRADIENTS, HORIZONTAL ORIENTATION, CRYSTALS, SMOKE, TEST METHODS, REPRINTS, BOTTOM, PLATES, HETEROGENEITY,

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ICE, NUCLEATION, CLOUD CHAMBERS, FILMS, POLYETHYLENE TEREPHTHALATE, SHEAR PROPERTIES, CLOUD PHYSICS, WATER VAPOR, VAPOR PRESSURE, VERTICAL ORIENTATION, SUPERCOOLING, MATHEMATICAL MODELS, WALLS.

IDENTIFIERS: (U) Shear flow, Thermal diffusion chambers, Ice nucleation, PE61102F, WUAFOSR23101A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 322 6/11

WASHINGTON STATE UNIV PULLMAN COLL OF PHARMACY

(U) Ethanol-Induced Changes in Trichloroethene Toxicity.

DESCRIPTIVE NOTE: Annual rept.,

SEP 87 57P

PERSONAL AUTHORS: Bull, Richard J.

CONTRACT NO. AFOSR-86-0284

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-87-1566

UNCLASSIFIED REPORT

ABSTRACT: (U) This project was to determine the extent to which metabolism of trichloroethylene (TCE) to trichloroacetic acid (TCA) was responsible for its hepatotoxic and hepatocarcinogenic effects in rodents. Ethanol was used as a more or less selective means of decreasing the production of TCA. This information was useful in determining whether these effects are relevant to human exposures to these chemicals. During the first year of this project, it was established that dichloroacetic acid (DCA), trichloroacetic acid and chloral hydrate (CH) all are capable of inducing single strand breaks in hepatic DNA of both mice and rats in vivo at much lower doses that could TCE. Metabolism studies suggest that the production of TCA can be modified by ethanol coadministration. Experiments revealed that DCA produces a cytomegally that is seen uniformly throughout the liver of the mouse. This effect is characterized by massive accumulations of glycogen. It does not produce this effect in rats given even higher doses, nor is the effect duplicated completely by TCA. In addition, mice treated with DCA are displaying focal areas of change that appear preneoplastic after only 24 weeks of treatment with DCA. These results suggest that DCA may play a more important role in the hepatotoxic and hepatocarcinogenic effects of TCE than had been previously appreciated. Keywords: Trichloroethylene, Hepatotoxicity, Ethanol, Hepatocarcinogenicity.

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AD-A187 322 CONTINUED

DESCRIPTORS: (U) *LIVER, *TOXICITY, *TRICHLOROETHYLENE, *CARCINOGENESIS, *ETHANOLS, ACCUMULATION, ALCOHOL CONSUMPTION, DEOXYRIBONUCLEIC ACIDS, DOSAGE, EXPOSURE(PHYSIOLOGY), GLYCOGEN HUMAN BODY, IN VIVO ANALYSIS, METABOLISM, MICE, PRODUCTION, RATS, RODENTS, TOXIC AGENTS, LIVER DISEASES, PHYSIOLOGICAL EFFECTS, RESPONSE(BIOLOGY).

IDENTIFIERS: (U) *Hepatotoxicity, Trichloroacetic acid, WUAFOSR2312A5, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 316G 4/1 20/14 17/9

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) An HF Phased-Array Radar for Studying Small-Scale Structure in the High-Latitude Ionosphere,

FEB 85

PERSONAL AUTHORS: Greenwald, R. A.; Baker, K. B.; Hutchins, R. A.; Hanuise, C.

CONTRACT NO. AFOSR-86-0028

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-87-1458

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Radio Science, v20 n1 p63-79 Jan/Feb 85. Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Since October 1983, a new coherent backscatter radar has been in operation at Goose Bay, Labrador, for the purpose of studying small-scale electron density structure in the high-latitude ionosphere. This radar operates over a frequency band that extends from 8 to 20 MHz, and it uses an electronically phased array of 16 log-periodic antennas for both transmission and reception. The radar transmits a seven-pulse pattern that enables one to determine 17-lag complex autocorrelation functions of the backscattered signals as a function of range and azimuth. In this paper we present a complete description of the radar including explanations of the operation of the phasing matrix, the techniques of data acquisition and analysis as implemented in the radar microcomputer, and the possible on-line and automatic operating modes that may be instituted. We also present examples of some of the initial results that we have obtained with the radar during the afternoon and late evening hours. These examples include images of the two-dimensional distribution of small-scale structure and of their associated mean Doppler motion. We also present examples of F region Doppler spectra derived from the complex

autocorrelation functions. These Doppler spectra show interesting differences from those of high-latitude E region irregularities. (Reprints)

DESCRIPTORS: (U) *AUTOCORRELATION, *BACKSCATTERING, *COHERENT RADAR, *DOPPLER SYSTEMS, *E REGION, *F REGION, DATA ACQUISITION, DISTRIBUTION, DOPPLER EFFECT, FREQUENCY BANDS, FUNCTIONS(MATHEMATICS), HIGH LATITUDES, IONOSPHERE, MEAN, MICROCOMPUTERS, MOTION, PHASED ARRAYS, RADAR, REPRINTS, SIGNALS, SPECTRA, TWO DIMENSIONAL.

IDENTIFIERS: (U) WUAFOSR2310A2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 311 12/1

OAK RIDGE NATIONAL LAB TN

(U) On General Row Merging Schemes for Sparse Givens Transformations.

DESCRIPTIVE NOTE: Final rept.,

OCT 86 24P

PERSONAL AUTHORS: Liu, Joseph W.

CONTRACT NO. AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1229

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Scientific and Statistical Computing, v7 n4 p1190-1211.

ABSTRACT: (U) This paper introduces general row merging schemes for the QR decomposition of sparse matrices by Givens rotations. They can be viewed as a generalization of row rotations (or merging). Based on the column ordering and the structure of the given sparse matrix, we present an algorithm to determine automatically a sequence of submatrix rotations appropriate for sparse decomposition. It is shown that the actual numerical computation can be organized as a sequence of reductions of two upper trapezoidal full submatrices into another upper trapezoidal full matrix. Experimental results are provided to compare the practical performance of the proposed method and the specific scheme. Significant reduction in arithmetic operations and factorization time is achieved in exchange of a very modest increase in working storage. The interpretation of general row merging as a special variable row pivoting method is also presented.

DESCRIPTORS: (U) *DECOMPOSITION, *SPARSE MATRIX, ALGORITHMS, ARITHMETIC, COMPUTATIONS, NUMERICAL METHODS AND PROCEDURES, REPRINTS, ROTATION, STORAGE, TIME, VARIABLES, ORTHOGONALITY, EXPERIMENTAL DATA,

AD-A187 311

AD-A187 311 CONTINUED

TRANSFORMATIONS(MATHEMATICS).

IDENTIFIERS: (U) Givens transformations.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 307 14/2 7/4

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Considerations in Building a Low-Noise Reflection Absorption Infrared Spectrometer,

JAN 87 9P

PERSONAL AUTHORS: Benziger, Jay B.; Preston, Richard E.; Schoofs, Gregory R.

CONTRACT NO. AFOSR-82-0302

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-1241

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Optics, v26 n2 p343-350, 15 Jan 87.

ABSTRACT: (U) The design and performance of several dispersive spectrometers for reflection absorption infrared spectroscopy are presented. Sources of noise and their control are discussed in detail. Individual component selection for the spectrometers is discussed with particular attention paid to optimizing sensitivity for surface measurements. These efforts culminated in an ellipsometric spectrometer with a sensitivity of <0.01% absorption and capable of following transients with a temporal resolution of 10 ms. Keywords: Infrared spectroscopy, Ellipsometry, Surface species, Surface reactions.

DESCRIPTORS: (U) *INFRARED SPECTROSCOPY, *SPECTROMETERS, ABSORPTION SPECTRA, DISPERSIONS, ELLIPSOMETERS, MEASUREMENT, NOISE, REFLECTION, SELECTION, SOURCES, SPECTROSCOPY, SURFACE REACTIONS, SURFACES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A187 306 21/2

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Recent Advances in Digital Fluorescence Imaging of High Temperature Flowfields,

87 8P

PERSONAL AUTHORS: Hanson, R. K.; Allen, M. G.; Lee, M. P.; Paul, P. H.

CONTRACT NO. AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-1240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the ASME/JSME Thermal Engineering Joint Conference, v1 p175-180 1987.

ABSTRACT: (U) Two dimensional laser induced fluorescence imaging offers prospects for non invasive, spatially and temporally resolved measurements of species concentrations and mole fractions, temperature, density, velocity and pressure in gaseous flowfields. Here we report two recent examples of research to develop such diagnostic capability: simultaneous imaging of OH and hydrocarbon (C2H2) distributions in premixed ethylene air flames; and temperature imagining in heated air using single photon fluorescence of oxygen. Keywords: Acetylene, Oxygen, Combustion, Temperature.

DESCRIPTORS: (U) *COMBUSTION, *FLOW FIELDS, *GASES, ACETYLENE, AIR, DIAGNOSIS(GENERAL), DIGITAL SYSTEMS, ETHYLENE, FLAMES, FLUORESCENCE, HEAT, HIGH TEMPERATURE, HYDROCARBONS, IMAGES, MIXING, OXYGEN, PHOTONS, SYNCHRONISM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 279 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Infrared Study of Electrochemically Prepared Homo and Mixed Polymer Films of Azulene,

85 13P

PERSONAL AUTHORS: Burzynski, Ryszard; Prasad, Paras N.; Bruckenstein, Stanley; Sharkey, John W.

CONTRACT NO. AFOSR-82-0118, $AFOSR-83-0004

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-87-1264

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Synthetic Metals, n11 p293-304 1985.

ABSTRACT: (U) Electrochemically formed homo-polyazulene and mixed polyazulene-polypyrrole films have been studied by infrared spectroscopy. Infrared spectra are consistent with a polymerization mechanism that involves loss of hydrogen atoms and produces an amorphous polymer structure. The spectral differences between the oxidized (conducting) and reduced (non-conducting) forms of polyazulene show the presence of a polarization interaction in the oxidized polymer, ever though the structure of both forms is similar. The i.r. bands of anions are present only for the oxidized form of the polymer, a result that indicates the existence of cationic charge centres on the polymer backbone. The counter anions have no detectable effect on the polymer structure and only a small effect on certain vibrational bands of the oxidized form. The electrochemical preparation of a mixed polyazulene polypyrrole phase is discussed and the mixed phase is found by i.r. spectroscopy to be a random copolymer. A bilayer polymer structure consisting of polyazulene and polypyrrole was also prepared and the i.r. spectra of this polymer structure did not indicate any interfacial interactions.

DESCRIPTORS: (U) *AMORPHOUS MATERIALS, *INFRARED RADIATION, *POLYMERS, *PYRROLES, ANIONS, ATOMS, BANDS(STRIPS), COPOLYMERS, ELECTROCHEMISTRY, HYDROGEN, INFRARED SPECTRA, INFRARED SPECTROSCOPY, INTERACTIONS, INTERFACES, LAYERS, LOSSES, MIXING, OXIDATION, POLARIZATION, POLYMERIC FILMS, POLYMERIZATION, PREPARATION, SPECTROSCOPY, VIBRATION, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

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AD-A187 274 7/4

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Cryogenic Acoustic Microscopy.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 85-31 Mar 87.

AUG 87 62P

PERSONAL AUTHORS: Quate, C. F.; Hadimioglu, B.

REPORT NO. GL-4240

CONTRACT NO. AFOSR-85-0168

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-1580

UNCLASSIFIED REPORT

ABSTRACT: (U) This work describes the advancements in the field of acoustic microscopy in superfluid helium at temperatures near 0.1 K. The microscope is presently capable of imaging materials using 300 A sound waves with 200 A resolution. Current developments include the search for operation of higher frequencies in order to get better resolution and improvements in the signal-to-noise ratio to get better images. A new technique has been developed to fabricate high efficiency acoustic transducers at ultra high frequencies. These transducers consist of multilayers of zinc oxide with alternating crystal structure. Multilayer transducers fabricated with the new technique have shown to convert nearly 10% of the electrical input power to acoustic power at frequencies as high as 30 GHz. This is several orders of magnitude better than any of the previous experiments. Keywords: Acoustic microscopy; Superfluid helium, Sound waves; Super; Acoustic transducers.

DESCRIPTORS: (U) *ACOUSTICS, *CRYOGENICS, *ELECTROACOUSTIC TRANSDUCERS, *MICROSCOPY, CRYSTAL STRUCTURE, EFFICIENCY, ELECTRIC POWER, FREQUENCY, HELIUM, HIGH RATE, IMAGES, INPUT, LAYERS, MATERIALS, OPERATION, POWER, SIGNAL TO NOISE RATIO, SOUND WAVES, SUPERFLUIDITY, TRANSDUCERS, ULTRAHIGH FREQUENCY.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 272 7/6 11/9

MISSOURI UNIV-ST LOUIS DEPT OF CHEMISTRY

(U) Conformational Characteristics of Some Liquid Crystalline Aromatic Heterocyclic Polymers Usable as High-Performance Materials,

87 20P

PERSONAL AUTHORS: Welsh, William J.

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-87-1399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Current Topics in Polymer Science, y1 p217-234 1987.

ABSTRACT: (U) The review on a new type of para-catenated aromatic polymer being used in the preparation of high-performance films and fibers of exceptional strength, thermal stability, and environmental resistance, including inertness to essentially all common solvents. Polymers of this type include the cis- and trans-poly(p-phenylene benzobisoxazole) (PBO), the cis- and trans-forms of the corresponding poly-(p-phenylene benzobisthiazole) (PBT), and the structurally similar poly(5,5' -bibenzoxazole-2,2' -diyl-1,3-phenylene) (AAPBO) and poly(2,5-benzoxazole) (ABPBO) and their sulfur-containing analogues. Because of their rigidity, these polymers become highly oriented in solution and some display liquid crystalline behavior. The purpose of this paper is to summarize the authors' theoretical work on the structures, conformational energies and intermolecular interactions for these chains, including, in some cases, the so-called articulated forms and the protonated forms known to exist in strong acids. The emphasis is on how such studies provide a molecular understanding of the unusual properties and processing characteristics of this new class of materials.

DESCRIPTORS: (U) *LIQUID CRYSTALS, *POLYMERS, ACIDS,

AD-A187 272 CONTINUED

BEHAVIOR, ENVIRONMENTS, FILMS, INTERACTIONS, MATERIALS, MOLECULE MOLECULE INTERACTIONS, PREPARATION, PROCESSING, RESISTANCE, SOLVENTS, THERMAL STABILITY, PLASTICS, AROMATIC COMPOUNDS, REPRINTS, HETEROCYCLIC COMPOUNDS, CROSSLINKING(CHEMISTRY), FIBERS.

IDENTIFIERS: (U) Paracatenation, PBO(Poly p Phenylene Benzobisoxazole), PBT*(Poly p Phenylene Benzobisthiazole), AAPBO(Poly 55 Benzoxazole 22 Diyl 13 Phenylene), ABPBO(Poly 25 Benzoxalzole), WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 261 20/4

LEHIGH UNIV BETHLEHEM PA DEPT OF MECHANICAL ENGINEERING AND MECHANICS

(U) An Analysis of the Motion and Effects of Hairpin Vortices.

DESCRIPTIVE NOTE: Interim rept. Jul 85-Jul 87,

JUN 87 223P

PERSONAL AUTHORS: Hon, Thon-Lon; Walker, James D.

REPORT NO. FM-11

CONTRACT NO. F49620-85-C-0108

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1389

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent studies suggest that the hairpin vortex plays an important, possibly dominant, role in the dynamics of turbulent flows near walls. This study addresses the following topics of the motion of hairpin vortices near solid walls on a theoretical basis: the nature of the evolution of hairpin vortices in a shear flow; the type of flow induced near a wall by a convected hairpin vortex; the character of the viscous response near a wall to the hairpin vortex motion; and the nature of the interaction of 2 hairpin vortices. A numerical procedure is developed to allow accurate evaluation of the trajectory of a 3-dimensional vortex for vortices having small cores. The integration method is based on a numerical approximation to the Biot-Savart integral; most existing vortex calculation methods have severe stability problems for vortices with small cores. These problems are overcome with the present method and technique is applied to compute the evolution of convected vortex loops and hairpin vortices, both in uniform flow and in shear flow above a wall. For hairpin vortices evolving in a shear flow, a regenerative process is observed wherein secondary hairpin vortices form outboard of the original hairpin vortex in a manner consistent with experimental

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observations. Calculations for 2 hairpin vortices, initially close to one another in a shear flow, show that the vortices interact to reinforce one another. Simulations carried out to compute the evolution of hydrogen bubble lines as a hairpin vortex passes show that such vortices can give rise to wall layer streaks.

DESCRIPTORS: (U) *VORTICES, *TURBULENT BOUNDARY LAYER, DYNAMICS, APPROXIMATION(MATHEMATICS), SHEAR PROPERTIES, TURBULENT FLOW, WALLS, VISCOSITY, INTEGRATION, NUMERICAL METHODS AND PROCEDURES, STABILITY, INVISCID FLOW, VISCOUS FLOW, INTERACTIONS.

IDENTIFIERS: (U) Hairpin vortices, Biot savart integrals, WUAFOSR2307A2, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 250 20/4

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Experimental Research on Swept Shock Wave/Boundary Layer Interactions.

DESCRIPTIVE NOTE: Interim technical rept. 1 Apr 86-31 Mar 87,

JUN 87 29P

PERSONAL AUTHORS: Settles, Gary S.

REPORT NO. PSU/ME-R-86/87-0034

CONTRACT NO. AFOSR-86-0082

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-87-1453

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments were carried out to assess Mach number effects on boundary layer due to generic fin and swept compression corner geometries. An extensive set of fin interaction experiments was carried out at constant Reynolds number over the Mach number range of 2.5 to 4.0. Data thus far consist of surface flow visualization photographs and laser light-screen visualizations of flowfield structure. Additional experiments were conducted to assess the possibility that experimental data of this type might depend on the wind tunnel facility in which the experiments were performed. That was not found to be the case. Results of the parametric Mach number study revealed that Mach number effects over the range considered are essentially inviscid. These were accounted for simply by referencing measured quantities to the freestream Mach angle. The interaction growth with increasing shock strength was found to be nonlinear, contrary to previous results. Initial results from swept compression corner experiments are also reported. Keywords: High speed flows; Viscous inviscid interactions; Supersonic flow; Flow visualization; Fluid dynamics; Flow separation.

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DESCRIPTORS: (U) *FINS, *SUPERSONIC FLOW, *SHOCK WAVES, *BOUNDARY LAYER, EXPERIMENTAL DATA, FLOW, FLOW FIELDS, FLOW SEPARATION, FLOW VISUALIZATION, FLUID DYNAMICS, GROWTH(GENERAL), INTERACTIONS, MACH NUMBER, PARAMETRIC ANALYSIS, PHOTOGRAPHS, RANGE(EXTREMES), REYNOLDS NUMBER, STRENGTH(MECHANICS), SURFACES, WIND TUNNELS, INVISCID FLOW, VISCOUS FLOW, ANGLES, HIGH VELOCITY, SKIN FRICTION.

IDENTIFIERS: (U) Swept shock waves, PE61102F, WUAFSOR2307A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 248 11/2

CERAMPHYSICS INC WESTERVILLE OH

(U) Research on High-Specific-Heat Dielectrics.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 86-30 Apr 87,

MAY 87 190P

PERSONAL AUTHORS: Lawless, W. N.; Clark, C. F.; Patton, B. R.; Kahol, P. K.; Dalal, N. S.

CONTRACT NO. F49620-86-C-0049

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-87-1452

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Ohio State Univ., West Virginia Univ. and Pennsylvania State Univ.

ABSTRACT: (U) This Annual Report details a program of research on composite spinel ceramic materials with enormous specific heat maxima in the temperature range 5-20 K. The results obtained so far have suggested an attractive picture for the ordering phenomena in the B-site spinels, CdCr2O4 and ZnCr2O4. Significant progress in characterizing and controlling the fabrication of the spinel materials has been made. Pure powders, compacted disks, as well as the 9/1 columbite composite have been made and characterized. Magnetocaloric experiments reveal no trace of hysteresis, which means that the phenomena involved in the low temperature transitions in the Zn and Cd spinels must involve second order transitions. Adiabatic demagnetization cooling above TN and also at low temperatures is indicative of paramagnetic spins, while a region of demagnetization heating just below TN seems to indicate anti-ferromagnetic ordering. Measurements have also discovered an amazing anomaly in the dielectric constant at the anti ferromagnetic transition. Keywords: Ceramic, Magnetocaloric, Spinels.

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DESCRIPTORS: (U) *CERAMIC MATERIALS, *COMPOSITE MATERIALS, *DIELECTRIC PROPERTIES, *SPINEL, ADIABATIC CONDITIONS, CONSTANTS, COOLING, DEMAGNETIZATION, DISKS, HEATING, HYSTERESIS, LOW TEMPERATURE, MATERIALS, POWDERS, PURITY, SPECIFIC HEAT, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 245 5/8 6/4 6/5 12/9

CALIFORNIA UNIV BERKELEY DEPT OF PHYSIOLOGY-ANATOMY

(U) Center for Nonlinear Dynamics of the Brain.

DESCRIPTIVE NOTE: Final rept. 31 Jul 86-30 Sep 87,

SEP 87 4P

PERSONAL AUTHORS: Freeman, Walter

CONTRACT NO. AFOSR-86-0271

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-87-1565

UNCLASSIFIED REPORT

ABSTRACT: (U) .The Center for Nonlinear Dynamics of the Brain (CNDB) studies nonlinear dynamics of large masses of nerve cells in animal and human brains as the basis for explaining the self-organization of goal-directed cognitive behaviors. We believe that this approach to the study of mass neural action will be a basic method of the neurophysiology of the twenty-first century. Our research has application to clinical neurology and psychiatry, to the measurement and enhancement of human mental capabilities and to the design of self-organizing, pattern recognition ccmputer systems. By extending techniques and models derived from the paleocortex to animal and human neocortex, deeper understanding of the neural basis of goal-directed higher brain functions will emerge. The practical consequences of this enhanced knowledge will be better diagnosis of neurologic and psychiatric diseases. It also will result in the ability to predict decrements in higher brain functions consequent to illness, fatigue or drugs. The new models for globally parallel, self-organizing systems which result from this research also will be directly relevant to the design of VLSI architectures for pattern recognition. Keywords: Mathematical modeling; Anatomical modeling.

DESCRIPTORS: (U) *BRAIN, *NEUROPHYSIOLOGY, *ANATOMICAL MODELS, *COGNITION, ANATOMY, MODELS, HUMANS, MENTAL

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ABILITY, MATHEMATICAL MODELS, DYNAMICS, NONLINEAR SYSTEMS, CLINICAL MEDICINE, DRUGS, MASS, NERVOUS SYSTEM, NERVE CELLS, PATTERN RECOGNITION, ARTIFICIAL INTELLIGENCE, BRAIN DAMAGE, DIAGNOSIS(MEDICINE), ELECTROPHYSIOLOGY, MENTAL DISORDERS, PSYCHIATRY, DISEASES.

IDENTIFIERS: (U) *Nonlinear dynamics, PE61102F, WUAFOSR2917A4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 241 20/3 20/5

STATE UNIV OF NEW YORK AT ALBANY DEPT OF CHEMISTRY

(U) Light Absorption by an Atom Moving Inside a Spherical Box.

DESCRIPTIVE NOTE: Technical rept.,

SEP 87

PERSONAL AUTHORS: Last, Isidore; George, Thomas F.

REPORT NO. UBUFFALO/DC/87/TR-53

CONTRACT NO. N00014-86-K-0043, F49620-86-C-0009

MONITOR: AFOSR
TR-88-0015

UNCLASSIFIED REPORT

ABSTRACT: (U) The radiative transition for an atom moving inside a spherical box is considered in the terms of electronic-field states. By using the hopping model, an analytical expression is obtained by numerical integration of the time-dependent Schrodinger equations. Keywords: Light absorption, Atom, Inside spherical box, Semiclassical model, Trajectory hopping, Electronic field states.

DESCRIPTORS: (U) *RADIATIVE TRANSFER, *ATOMIC ENERGY LEVELS, *ATOMIC SPECTROSCOPY, ABSORPTION, ATOMS, LIGHT, NUMERICAL INTEGRATION, SCHRODINGER EQUATION, TIME DEPENDENCE, TRANSITIONS, RADIATION ABSORPTION.

IDENTIFIERS: (U) Hopping Model.

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AD-A187 221 11/4

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) Analytical and Experimental Characterization of Damage Processes in Composite Laminates.

DESCRIPTIVE NOTE: Annual progress rept. Jun 86-Jul 87,

JUL 87 36P

PERSONAL AUTHORS: Dvorak, George J.; Laws, Norman

CONTRACT NO. AFOSR-84-0366

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR-87-1451

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents a brief summary of results obtained in our research program on damage development in fibrous composite laminates. The following technical subjects are described: (i) Effect of fiber breaks on stiffness changes in unidirectional composites. (ii) Stress analysis of transverse cracks. (iii) Progressive transverse cracking of 0/90 laminates. (iv) Analysis of cracks approaching a boundary between two materials. (v) Fatigue of B/Al laminates. Keywords: Composite materials; Epoxy laminates; Laminates; Crack propagation; Cracking(Fracturing); Aluminum; Boron; Balnium.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *CRACKS, *LAMINATES, ALUMINUM, BORON, CRACK PROPAGATION, DAMAGE, EPOXY LAMINATES, FIBERS, STIFFNESS, STRESS ANALYSIS, UNIDIRECTIONAL, DEFECT ANALYSIS, GRAPHITED MATERIALS, MODULUS OF ELASTICITY, MATHEMATICAL ANALYSIS, BOUNDARY LAYER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B2.

AD-A187 221

AD-A187 220 12/4

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) Reliability Analysis.

DESCRIPTIVE NOTE: Final rept. 1 Apr 81-31 Aug 86,

AUG 86 22P

PERSONAL AUTHORS: Barlow, Richard E.; Jewell, William S.; Ross, Sheldon M.

CONTRACT NO. AFOSR-81-0122

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-0849

UNCLASSIFIED REPORT

ABSTRACT: (U) The operations research accomplishments of three principal investigators are described. Areas with results are system reliability, combination of opinions, Bayesian applications to data analysis and quality assurance, reliability growth and software reliability, Bayesian approximation methods, risk portfolio problems, hierarchical models, simulation, estimation and testing, reliability models, and peaks from random data.

DESCRIPTORS: (U) *OPERATIONS RESEARCH, *RELIABILITY, BAYES THEOREM, COMPUTER PROGRAM RELIABILITY, DATA PROCESSING, GROWTH(GENERAL), QUALITY ASSURANCE, SIMULATION, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A187 220

AD-A187 217 20/11

COLORADO UNIV AT BOULDER DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Robust Controller Design for Flexible Structures,

87 13P

PERSONAL AUTHORS: Su, Renjeng; Arbouz, Nassim M.

CONTRACT NO. AFOSR-86-0198

MONITOR: AFOSR TR-87-1561

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers the problem of control of a beam which is moving in the x-y plane. It extends from x=0 to x=L. The left end at x=0 is clamped to an actuator which moves the beam along the v-axis. The control input is the force u(t) in y direction. While moving, the beam may vibrate. Let z(t) denote the displacement of the left from y=0, and w(t,x), the displacement of the beam from the line y=z(t) at position x and time t. Suppose a position sensor is place on the beam and the sensing output is v(t, sub 0)=z(t) + w(t,x0), where 0<x sub 0<L is the sensor location. We are interested in the case when the flexure w(t,x) of the beam is significant. The problem is to synthesize a feedback control law which moves the beam from one position to another in a stable manner. It is well known that when the sensor and the actuator are colocated a simple lead compensator suffices to produce a stable design. This result holds even when the beam dynamics are considered as a system with infinite zero-damping modes, and can be shown using root locus argument. This stabilization method may break down, however, when there is a positional gap between the sensor and actuator. In this case the classical compensation techniques are no longer effective. Time-domain optimization approaches based on state-space models have been applied to this problem. This article presents a case study of noncolocated beam control problem using frequency-domain optimization method proposed by Professor Kwakernaak. We emphasize the choice of the weighting functions in the cost function, and the search method which always leads to stable designs.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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DESCRIPTORS: (U) *CONTROL THEORY, *FLEXIBLE STRUCTURES, ACTUATORS, COMPENSATION, CONTROL, DISPLACEMENT, FEEDBACK, POSITION(LOCATION), DYNAMICS, INPUT, COSTS, DETECTORS, LOCUS, SEARCHING, COMPENSATORS, STABILITY, WEIGHTING FUNCTIONS, STABILIZATION, OPTIMIZATION, TIME DOMAIN, BEAMS(STRUCTURAL).

AD-A187 214 12/1

MARYLAND UNIV COLLEGE PARK

(U) Analysis of the Performance of Mixed Finite Element Methods.

DESCRIPTIVE NOTE: Annual technical rept. 30 Sep 85-30 Sep 86,

OCT 86

PERSONAL AUTHORS: Suri, Manil

CONTRACT NO. AFOSR-85-0322

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1570

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigator was able to prove an optimal error estimate for approximating functions in sobolev spaces using a space of pieceurse polynomial functions (based on the p-version of the finite element method). Optimal approximation results were also obtained for the h-p version of the finite element method using quasiuniform meshes. Papers accepted for publication during this period of effort included such titles as The optimal convergence rate of the p-version of the finite element methods, Some optimal approximation results with applications to the h-p-, and h-p versions of the finite element method, and The h-p version of the finite element method with quasi-uniform meshes. Keywords: Stability; Polynomials; Lagrange multipliers; Laplace equations.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, CONVERGENCE, EQUATIONS, ERRORS, ESTIMATES, LAGRANGIAN FUNCTIONS, LAPLACE TRANSFORMATION, MIXING, OPTIMIZATION, POLYNOMIALS, RATES, STABILITY, MESH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A187 217

AD-A187 214

AD-A187 212 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Polymerization of Furil in the Solid State by Reaction with AsF5 at the Solid-Gas Interface.

85 10P

PERSONAL AUTHORS: Burzynski, Ryszard; Prasad, Paras N.

CONTRACT NO. AFOSR-82-0118

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1457

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Polymer Science: Polymer Physics Edition, v23 p2193-2201 1985.

ABSTRACT: (U) Solid-state polymerization of furil, induced by reaction with AsF5 at the solid-gas interface, has been investigated by means of vibrational analysis of the reactant and the product. Infrared spectra are consistent with the mode of polymerization which involves an alpha linkage and subsequent loss of hydrogen atoms. The C/H elemental analysis suggests that the polymer consists of around six or seven monomeric units. The reaction product is found to be unstable at high temperatures; a prolonged annealing at this temperature leads to a different structure, possibly, by the opening of the furan rings. The x-ray powder diffraction study shows that the polymeric furil is crystalline, with a lattice similar to that of the monomer, but contains a considerable amount of disorder.

DESCRIPTORS: (U) *ANNEALING, *FURANS, *POLYMERIZATION, ATOMS, DIFFRACTION, HIGH TEMPERATURE, HYDROGEN, INFRARED SPECTRA, LINKAGES, LOSSES, POWDERS, REACTION KINETICS, RESPONSE, RINGS, SOLID STATE ELECTRONICS, SOLID STATE PHYSICS, VIBRATION, X RAYS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

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AD-A187 211 12/5 20/2

ARIZONA STATE UNIV TEMPE SEMICONDUCTOR MATERIALS RESEARCH LAB

(U) Autonomous Liquid Encapsulated Czochralski (LEC) Growth of Single Crystal GaAs by 'Intelligent' Digital Control.

DESCRIPTIVE NOTE: Technical rept.,

AUG 87 42P

PERSONAL AUTHORS: Reidling, Karl; Schwuttke, G. H.

CONTRACT NO. F49620-86-C-0012, $$ARPA Order-9099

MONITOR: AFOSR TR-87-1500

UNCLASSIFIED REPORT

ABSTRACT: (U) Virtually total automation of the high-pressure LEC process for GaAs growth could be achieved with an intelligent growth control approach which combines deterministic and heuristic techniques. A number of 4 kg, 3 inch semi-insulating GaAs crystals have been grown reproducibly on an adapted Cambridge Instruments CI 358 puller without any significant operator intervention; even complex process steps like seeding and tail-off could be successfully handled by the system on its own. Process yields of more than 75 percent single crystals could be accomplished. Crystals grown with the digital system were superior in uniformity and diameter control, compared to conventionally grown crystals. Keywords: Crystal growth, Artificial intelligence, Automation.

DESCRIPTORS: (U) *CRYSTAL GROWTH, *DIGITAL SYSTEMS, *GALLIUM ARSENIDES, ARTIFICIAL INTELLIGENCE, AUTOMATION, CRYSTALS, CZOCHRALSKI CRYSTALS, DETERMINANTS(MATHEMATICS), ENCAPSULATION, GROWTH(GENERAL), HEURISTIC METHODS, HIGH PRESSURE, INSULATION, INTERVENTION, LIQUIDS, OPERATORS(PERSONNEL), SINGLE CRYSTALS.

AD-A187 211

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 210 12/5 20/2

ARIZONA STATE UNIV TEMPE SEMICONDUCTOR MATERIALS RESEARCH LAB

(U) Digital Control of the Czochralski Growth of Gallium Arsenide-Controller Software Reference Manual.

DESCRIPTIVE NOTE: Final scientific rept. 1 Oct 85-31 Mar 87,

JUL 87 197P

PERSONAL AUTHORS: Riedling, Karl; Schwuttke, G. H.

CONTRACT NO. F49620-85-C-0010, $$ARPA Order-5187

MONITOR: AFOSR TR-87-1542

UNCLASSIFIED REPORT

ABSTRACT: (U) This volume provides a complete description of the structure and the operation of the specific controller software developed for ASU's digital Czochralski Growth Control System (CGCS) for compound semiconductors. The manual is primarily intended for use by advanced programmers and crystal growth specialists. In four main chapters, the Controller Software Reference Manual discusses the design considerations applied to digital LEC crystal growth control, give a short overview over the growth controller computer hardware and operating system environment, describes the functions of the CGCS from an operator's point of view, and delineates the internal operations of the controller software by discussing the controller software and algorithms. Various appendices provide tables of controller software tasks, routines, and variables, file format information, and lists of system messages and error codes. Keywords: Gallium arsenides.

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTER PROGRAMS, *CRYSTAL GROWTH, *GALLIUM ARSENIDES, CONTROL, CZOCHRALSKI CRYSTALS, DIGITAL SYSTEMS, ERROR CORRECTION CODES, GROWTH(GENERAL), INTERNAL, MANUAL OPERATION, PROGRAMMERS, SEMICONDUCTORS, TABLES(DATA).

AD-A187 209 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Estimation in Linear Models with Censored Data.

DESCRIPTIVE NOTE: Technical rept. Aug 86-Aug 87,

86 6P

PERSONAL AUTHORS: Schneider, Helmut; Weissfeld, Lisa

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1060

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biometrika, 73 n3 p741-745 1986.

ABSTRACT: (U) Three methods for linear regression with censored data are considered, that of Buckley & James (1979), a proposed simpler nonparametric method and a normal model for censored data. A new estimator for the variance of the error term in Buckley & James's procedure is proposed and simulations comparing the three methods are described. Keywords: Reprints; Algorithms; Kaplan Meier estimators; Mathematical models.

DESCRIPTORS: (U) *LINEAR REGRESSION ANALYSIS, *MATHEMATICAL MODELS, ALGORITHMS, ERRORS, ESTIMATES, LINEARITY, NONPARAMETRIC STATISTICS, REPRINTS, VARIATIONS, DISTRIBUTION FUNCTIONS.

IDENTIFIERS: (U) Kaplan Meier estimators, PE61102F, WUAFOSR23045A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 203 9/3 20/5

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Sensitivity of Atomic Line Shapes to the Laser Model,

87 3P

PERSONAL AUTHORS: Arnoldus, Henk F.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-87-1381

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectral Line Shapes, v4 p569-570 1987.

ABSTRACT: (U) For coherent excitation of an atom by a single mode laser, it is found that the commonly applied Gaussian diffusion process can give a poor account of laser linewidth effects at high intensities on the shape of spectral lines. Keywords: Atomic line shapes; Sensitivity; Laser model; Photon correlations; Statistics; Gaussian diffusion; Reprints.

DESCRIPTORS: (U) *LASER BEAMS, *SPECTRAL LINES, ATOMIC SPECTRA, ATOMS, COHERENCE, CORRELATION, EXCITATION, HIGH RATE, INTENSITY, LASERS, MODELS, PHOTONS, RADIATION EFFECTS, REPRINTS, SHAPE, APPROXIMATION(MATHEMATICS), PUMPING(ELECTRONICS), ELECTRON ENERGY, ATOMIC ENERGY LEVELS.

IDENTIFIERS: (U) Gaussian diffusion, PE61102F, WUAFOSR2303B3.

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AD-A187 200 11/7 12/2

STANFORD UNIV CA DIV OF APPLIED MECHANICS

(U) The Hamiltonian Structure of Nonlinear Elasticity: The Convective Representation of Solids, Rods, and Plates,

DEC 86 63P

PERSONAL AUTHORS: Simo, Juan C.; Marsden, Jerrold E.; Krishnaprasad, P. S.

CONTRACT NO. DE-AT03-85ER12097, $AFOSR-87-0073

MONITOR: AFOSR
TR-87-1384

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant $NSF-OIR85-00108

ABSTRACT: (U) It is our belief that a thorough understanding of the mathematical underpinnings of elasticity is crucial to its analytical and numerical implementation. For example, in the analysis of rotating structures, if one attempts to couple geometrically inexact models, obtained by linearization or other approximations to rotating rigid bodies, one can easily get serious artificial softening effects that can significantly alter numerical results; see Simo and Vu-Quoc for a discussion (compare equations of that paper). In this paper, we consider geometrically exact models, such as the Kirchhoff-Love-Reissner-Antman model for rods and its counterpart for plates and shells. These models take into account shear and torsion as well as the usual bending effects in traditional rod and plate models. Our purpose is to systematically develop the Hamiltonian structure for the dynamics of these models in the convective representation. The convective representation is chosen for its computational convenience and for our planned coupling of these models to the dynamics of rigid body motion, as in Krishnaprasad and Marsden. One of the topics that is of importance in the foundations of elasticity is a geometric formulation of the equations in Hamiltonian form.

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *NONLINEAR SYSTEMS, *RODS, *SOLIDS, BENDING, BODIES, BODIES OF REVOLUTION, CONVECTION, DYNAMICS, EQUATIONS, FORMULATIONS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 200 CONTINUED

FOUNDATIONS(STRUCTURES), GEOMETRY, HAMILTONIAN FUNCTIONS, LINEARITY, MOTION, NUMERICAL ANALYSIS, RIGIDITY, ROTATION, SOFTENING, STRUCTURES.

AD-A187 168 12/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Continuous Stabilizers and High-Gain Feedback,

86 18P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1159

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IMA Jnl. of Mathematical Control and Information, v3 p237-253 1986.

ABSTRACT: (U) A controller is shown to exist, universal for the family of all systems of fixed dimension n with m controls, which stabilizes those systems that are stabilizable whenever certain gains are large enough. The controller parameters are polynomial functions of the entries of the plant. As a consequence, a result is proved on polynomial stabilization of families of systems.

DESCRIPTORS: (U) *FEEDBACK, *CONTROL THEORY, CONTROL, HIGH GAIN, POLYNOMIALS, SIZES(DIMENSIONS), STABILIZATION, STABILIZATION SYSTEMS, REPRINTS, INVARIANCE, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 156 9/3

PHYSICAL SCIENCES INC ANDOVER MA

(U) Solar Pumped, Alkali Vapor Laser.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 86,

SEP 87 58P

PERSONAL AUTHORS: Ham, David; DeFaccio, Mark A.

REPORT NO. PSI-118/TR-718

CONTRACT NO. F49620-84-C-0118

PROJECT NO. 2301

TASK NO. K1

MONITOR: AFOSR
TR-87-1535

UNCLASSIFIED REPORT

ABSTRACT: (U) High power lasers based in space have been considered as sources for power transmission, laser propulsion, materials processing and space defense. The feasibility of such systems is based on the cost per unit power delivered, with detailed studies indicating that light weight has a greater impact on cost than laser efficiency. Solar radiation is a natural source of power for these devices and two methods for conversion of solar radiation to laser radiation can be considered. An indirectly solar pumped laser would first convert the solar radiation to electricity or longer wavelength blackbody radiation which is then used to power the laser. A directly longer wavelength blackbody radiation which is then used to power the laser. A directly pumped solar laser would utilize a portion of te solar spectrum to directly pump the laser medium, eliminating the intervening step and substantially reducing the systems weight and complexity. Detailed comparisons showed a directly pumped laser with an overall efficiency of only 1.5 percent can compete with an indirectly energized solar laser with an overall efficiency of ten percent. With this in mind, a concept for a directly solar pumped laser was developed based on an alkali vapor (sodium) as the laser medium. Keywords: Solar, Laser.

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DESCRIPTORS: (U) *ALKALI METALS, *HIGH POWER, *LASERS, *VAPORS, BLACKBODY RADIATION, COSTS, DEFENSE SYSTEMS, EFFICIENCY, ELECTRICITY, IMPACT, LASER BEAMS, LASER PUMPING, LIGHTWEIGHT, MATERIALS, POWER, POWER SUPPLIES, PROCESSING, PROPULSION SYSTEMS, SODIUM, SOLAR RADIATION, SOLAR SPECTRUM, SPACE SYSTEMS, TRANSMITTANCE, WEIGHT.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 155 7/4

MAINE UNIV AT ORONO LAB FOR SURFACE SCIENCE AND TECHNOLOGY

(U) Kinetics of Interface Reactions. Proceedings of a Workshop on Interface Phenomena, Held in Campobello Island, Canada on 24-27 September 1986.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Jun 87,

SEP 86 311P

PERSONAL AUTHORS: Grunze, M.; Kreuzer, H. J.

CONTRACT NO. AFOSR-86-0245

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-1449

UNCLASSIFIED REPORT

Availability: Springer-Verlag, 44 Hartz Way, Secaucus, NJ 07094. HC $55.00. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) The first Workshop of Interface Phenomena concentrated on just three topics related to the kinetics of interface reactions: (1) adsorption-desorption kinetics, (2) precursors, (3) kinetics and phase transitions. The adsorption and desorption processes themselves are to be understood as surface bond making and breaking mechanisms, respectively. If the energy transfer is fast enough, then these processes can be understood in terms of thermodynamic arguments such as formulated in transition state theory. However, in most situations such as simple treatment is not sufficient and the details of the microscopic dynamics must be invoked. Unfortunately, this point is very frequently overlooked in the analysis of kinetic data of gas-surface reactions, leading to rather murky discussions in the literature. The phenomenological analysis of surface reactions in terms of kinetic rate equations quite often has to invoke precursor states as reaction intermediates to fit experimental data. However, because such an analysis rarely leads to a unique answer, independent evidence must be brought forward if precursors in a given reaction

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are to be accepted as more than just mythical mis-fits. The equilibrium properties of surface phase transitions have been studied for many decades, and they exhibit a wealth of fascinating detail. The exploration of their kinetics, on the other hand, had to await the advent of time resolved surface analysis techniques. In particular, video-LEED has made it possible to study kinetics of surface reconstruction.

DESCRIPTORS: (U) *ADSORPTION, *DESORPTION, *GAS SURFACE INTERACTIONS, *INTERFACES, *SURFACE REACTIONS, *SURFACE CHEMISTRY, *REACTION KINETICS, DYNAMICS, ENERGY TRANSFER, EQUATIONS, EQUILIBRIUM(GENERAL), EXPERIMENTAL DATA, KINETICS, MICROSCOPY, PHASE TRANSFORMATIONS, REACTION KINETICS, SURFACE ANALYSIS, SURFACES, THEORY, TRANSITIONS, WORKSHOPS, SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2303A2, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ5OD

AD-A187 153 7/2

VICTORIA UNIV OF MANCHESTER (ENGLAND) DEPT OF CHEMISTRY

(U) Chemiluminescent Reactions of Fluorine Atoms with Inorganic Iodides in the Gas Phase.

87 8P

PERSONAL AUTHORS: Raybone, David; Watkinson, Timothy M.; Whitehead, J. C.

CONTRACT NO. AFOSR-85-0039

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1402

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Faraday Transactions 2, v83 p767-773 1987.

ABSTRACT: (U) Visible chemiluminescence in the spectral range 200-900 nm has been measured for the reactions of F atoms with a range of inorganic iodides studied at reduced pressures (ca. 0.7 mbar). There is only one emitter present in all cases viz. IF* (B). The IF* (B) vibrational state distributions and rotational temperatures are essentially the same for all the systems studied. The yield of IF* can be substantially increased by adding 02 (1delta) to the flame or by increasing the F atom concentration. It is suggested that the origin of IF*(B) in these reactions and other similar systems previously studied may be the recombination reaction of spin-orbit excited iodine atoms with ground-state fluorine atoms. Keywords: Iodine monofluoride.

DESCRIPTORS: (U) *ATOMS, *FLUORIDES, *IODIDES, *VAPOR PHASES, CHEMICAL REACTIONS, CHEMILUMINESCENCE, DISTRIBUTION, EMITTERS, FLUORINE, INORGANIC MATERIALS, IODINE, IODINE COMPOUNDS, ORBITS, PRESSURE, RECOMBINATION REACTIONS, REDUCTION, SPINNING(MOTION), VIBRATION, VISIBLE SPECTRA, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

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AD-A187 152 12/6 12/2 25/5

OAK RIDGE NATIONAL LAB TN

(U) Sparse Cholesky Factorization on a Local-Memory Multiprocessor.

DESCRIPTIVE NOTE: Final rept.,

APR 86 24P

PERSONAL AUTHORS: George, Alan; Heath, Micheal T.; Liu, Joseph; Ng, Esmond

REPORT NO. ONRL-TM-9962

CONTRACT NO. AFOSR-ISSA-85-0083

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1572

UNCLASSIFIED REPORT

ABSTRACT: (U) This article deals with the problem of factoring a large sparse positive definite matrix on a multiprocessor system. The processors are assumed to have substantial local memory but no globally shared memory. They communicate among themselves and with a host processor through message passing. Our primary interest is in designing an algorithm which exploits parallelism, rather than in exploiting features of the underlying topology of the hardware. However, part of our study is aimed at determining, for certain sparse matrix problems, whether hardware based on the binary hypercube topology adequately supports the communication requirements for such problems. Numerical results from experiments running on a multiprocessor simulator are included.

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *MEMORY DEVICES, *MULTIPROCESSORS, *PROCESSING EQUIPMENT, *TOPOLOGY, ALGORITHMS, NUMERICAL ANALYSIS, REQUIREMENTS, SIMULATORS, SPARSE MATRIX, TIME SHARING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 151 12/3

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

(U) Characterization of Nonhomogeneous Poisson Processes Via Moment Conditions.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 20P

PERSONAL AUTHORS: Fang, Zhaoben

REPORT NO. TR-86-05

CONTRACT NO. N00014-84-K-0084, $AFOSR-84-0113

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-87-1081

UNCLASSIFIED REPORT

ABSTRACT: (U) Poisson processes play an important role in many fields. The Poisson process is one of the simplest counting processes and is a building block for many other processes, especially for general independent increment processes. Many definitions have been given for a counting process to be a Poisson process and many papers have appeared dealing with characterizations for the Poisson distribution and the Poisson process. Among the qualitative conditions defining a Poisson process, independent increments is one of the most important conditions. In this paper we attempt to use other conditions in place of independent increments. This provides a somewhat different viewpoint for examining Poisson processes. In addition, new characterizations for the nonhomogeneous Poisson process via moment conditions are obtained which might be easier to utilize in practice.

DESCRIPTORS: (U) *COUNTING METHODS, *POISSON DENSITY FUNCTIONS, DISTRIBUTION, INTERVALS, MOMENTS, POISSON EQUATION.

IDENTIFIERS: (U) *Poisson processes, PE61102F, WUAFOSR2304K3.

AD-A187 151

AD-A187 146 12/2

OAK RIDGE NATIONAL LAB TN

(U) Row-Ordering Schemes for Sparse Givens Transformations. 2. Implicit Graph Model.

DESCRIPTIVE NOTE: Final rept.,

86 22P

PERSONAL AUTHORS: George, Alan; Liu, Joseph; Ng, Esmond

CONTRACT NO. AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1227

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear Algebra and Its Applications, v75 p203-223 1986.

ABSTRACT: (U) A new graph model is presented to study the row annihilation and row ordering problems in the QR decomposition of sparse matrices using Givens rotations. The graph-theoretic results obtained can be used to derive good row orderings for certain column orderings, such as width-1 and width-2 nested dissection orderings. This model is different from the bipartite-graph model introduced in a previous work. We refer to the new model as implicit because the rows are not represented explicitly by nodes, in contrast to the bipartite-graph model, where the rows are represented by nodes in a bipartite graph.

DESCRIPTORS: (U) *DECOMPOSITION, *SPARSE MATRIX, ANNIHILATION REACTIONS, DISSECTION, GRAPHS, MODELS, REPRINTS, THEORY.

IDENTIFIERS: (U) Givens rotation, Bipartite graphs, PE61102F, WUAFOSR2304A3.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 145 6/1 6/4

NORTHWESTERN UNIV EVANSTON IL COLL OF ARTS AND SCIENCES

(U) Phosphoprotein Regulation of Synaptic Reactivity: Enhancement of a Molecular Gating Mechanism.

DESCRIPTIVE NOTE: Annual progress rept.,

AUG 87 10P

PERSONAL AUTHORS: Routtenberg, Aryeh

CONTRACT NO. AFOSR-87-0042

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1499

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is focussed on the role of molecular switches in brain which regulate synaptic reactivity. We have identified a 47,000 mol wt phosphoprotein and its kinase (c) which play a pivotal role in this regulation. We have enhanced communication among nerve cells studied electrophysiologically by activation of this kinase. In the proposed research we specifically manipulate this brain phosphoprotein with novel kinase activating agents. In a new initiative, both the kinase and the F1 substrate will be studied with the goal of enhancing synaptic reactivity by regulating the activity of proteins that play a pivotal role in this process. Keywords: Nerve transmission; Synapse; Plasticity; Reactivity; Phosphorylation; Protein kinase C; Protein F1; Fatty acids.

DESCRIPTORS: (U) *NERVE TRANSMISSION, *SYNAPSE, *PHOSPHOPROTEINS, *ELECTROPHYSIOLOGY, ACTIVATION, BRAIN, FATTY ACIDS, MOLECULES, NERVE CELLS, PHOSPHORYLATION, PROTEINS, REACTIVITIES, SWITCHES, NEUROCHEMISTRY, REACTION KINETICS.

IDENTIFIERS: (U) *Kinase activity agents, Kinase, PE61102F, WUAFOSR2312A2.

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LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y

(U) Analysis of Interannual Variations of Snow Melt on Arctic Sea Ice Mapped from Meteorological Satellite Imagery,

AUG 87 13P

PERSONAL AUTHORS: Robinson, David A.; Scharfen, Greg; Barry, Roger G.; Kukla, George

CONTRACT NO. AFOSR-86-0053

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-87-1498

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Large Scale Effects of Seasonal Snow Cover, p315-327 Aug 87.

ABSTRACT: (U) The seasonal progression of snow melt on the Arctic ice pack was mapped from shortwave satellite imagery for 1977, 1979, 1984 and 1985. The four years showed substantial differences in the timing of the melt interval. The progression of melt in May and June of the earliest melt year (1977) was about three weeks ahead of the latest year (1979). As a result, basin-wide surface albedo varied by upwards of 0.08 in June, ranging from 0.58 in 1977 to 0.66 in 1979. May and July showed interannual variations in albedo of up to 0.05. The extent of snow melt varied from year to year in the central Arctic. The region was essentially snow-free by mid-July in 1977 and 1979, but retained some snow throughout the summer in 1984 and for all but two weeks in 1985. Although limited in extent, our data base suggests relationships between snow melt and Arctic surface air temperatures in spring, spring cloudiness, and the extent of late summer ice. (Reprints)

DESCRIPTORS: (U) *MELTING, *SEA ICE, AIR, ALBEDO, ARCTIC OCEAN, ARCTIC REGIONS, ATMOSPHERIC TEMPERATURE, CLOUD COVER, DATA BASES, ICE, IMAGES, INTERVALS, MELTS, METEOROLOGICAL SATELLITES, PACK ICE, REPRINTS, SATELLITE

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 144 CONTINUED

PHOTOGRAPHY, SNOW, SPRINGS, SUMMER, SURFACE TEMPERATURE.

IDENTIFIERS: (U) PE61102F.

AD-A187 138 12/3

CALIFORNIA UNIV DAVIS INTERCOLLEGE DIV OF STATISTICS

(U) Annual Report on Research Sponsored by Grant AFOSR-84-0159.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 86-30 Jun 87,

JUL 87 10P

PERSONAL AUTHORS: Samaniego, F. J.

CONTRACT NO. AFOSR-84-0159

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1461

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Estimation in the NBU class of Survival Distributions; Estimation of Survival Distributions which are New Better Than Used With Respect to a Distinguished Set; On Comparing Coherent Systems; On Failure Rate Estimation When Test and Operating Environments Differ; Joint Life-Time Distributions; Stochastic Differential Equations for Repair Policies; Positive Dependence, Upper Sets, and Multidimensional Partitions; Estimation of Multivariate Distributions Under Stochastic Ordering; and Computational Aspects of Association for Bivariate Discrete Distributions.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, BIVARIATE ANALYSIS, COHERENCE, DIFFERENTIAL EQUATIONS, DISCRETE DISTRIBUTION, ESTIMATES, FAILURE, STATISTICAL DISTRIBUTIONS, MULTIVARIATE ANALYSIS, POLICIES, RATES, REPAIR, STOCHASTIC CONTROL, SURVIVAL(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 123 20/11 12/9

GEORGETOWN UNIV WASHINGTON D C DEPT OF MATHEMATICS

(U) Boundary Stabilization of Thin Elastic Plates,

87 16P

PERSONAL AUTHORS: Lagnese, John E.

CONTRACT NO. AFOSR-86-0162

MONITOR: AFOSR
TR-87-1562

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper we shall consider the question of uniform stabilization of thin, elastic plates through the action of forces and moments on the edge of the plate (or on a part of the edge of the plate). Two particular plate models will be considered: The classical fourth order Kirchoff model, but incorporating rotational inertia, and the sixth order Mindlin-Timoshenko model. The difference in the two models, from a physical point of view, is that the M-T model incorporates transverse shear effects while the Kirchhoff model does not. Actually, the M-T model is a hyperbolic system three coupled second order partial differential equations in two dependent variables. The unknowns, denoted by w, psi, phi are the vertical component w of displacement and angles which are measures of the amount of transverse shear. The three equations are coupled through terms which are multiples of a factor K called the coefficient of elasticity in shear.

DESCRIPTORS: (U) *BOUNDARIES, *PLATES, COEFFICIENTS, DISPLACEMENT, ELASTIC PROPERTIES, EQUATIONS, INERTIA, PHYSICAL PROPERTIES, ROTATION, SHEAR PROPERTIES, STABILIZATION, THINNESS, TRANSVERSE, VARIABLES, VERTICAL ORIENTATION, CONTROL THEORY, TIMOSHENKO BEAM.

IDENTIFIERS: (U) Thin plate theory.

AD-A187 122 25/5 12/2

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

(U) Mathematical Problems in Stability, Control and Reliability of Random Access Communication Systems.

DESCRIPTIVE NOTE: Final scientific rept. 15 May 82-14 May 87,

JUL 87 9P

PERSONAL AUTHORS: Rosenkrantz, Walter A.

CONTRACT NO. AFOSR-82-0167

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-87-1467

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the principal investigator's final scientific report containing: (i) list of publications, (ii) invited lectures, conferences, symposia, (iii) Professional personnel associated with research effort, (iv) Status of current research, (v) list of references to probe further. Keywords include: Random access communication protocols, Aloha, Ethernet, Ergodicity, and Bistability.

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *MATHEMATICS, RANDOM ACCESS COMPUTER STORAGE, RELIABILITY, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 121 20/12 9/1 20/2

CORNELL UNIV ITHACA NY SCHOOL OF ELECTRICAL ENGINEERING

(U) Microwave Semiconductor Research-Materials, Devices and Circuits.

DESCRIPTIVE NOTE: Final rept. 1 May 84-30 Apr 87,

OCT 87 53P

PERSONAL AUTHORS: Eastman, L. F.; Shealy, J. R.; Woodard, D. W.; Mukherjee, S.; Wicks, G. W.

CONTRACT NO. F49620-84-C-0060

MONITOR: AFOSR TR-87-1632

UNCLASSIFIED REPORT

ABSTRACT: (U) This program covers the growth and assessment of gallium arsenide and related compounds and alloys for use in microwave, millimeter wave, and optical devices. It also covers the processing of the material into devices, the testing of the devices, and the theoretical modeling of carrier transport in these devices. Both molecular beam epitaxy (MBE) and organometallic vapor phase epitaxy (OMVPE) are used for growth. The following specific tasks are pursued: Develop an improved understanding of the role of the substrate and growth parameters on the quality of device structures on GaAs and related materials grown by OMVPE, Investigate the frequency and power limits of power FET devices employing a two-dimensional electron gas in the channel, Investigate and improve heterojunction structures for transistor applications, Produce semiconductor light emitters capable of high speed amplitude modulation, Femtosecond optical investigation of hot carrier dynamics in III-V compounds and quantum wells. Develop high speed receivers for optical communication using optical field effect transistors and large area epitaxial photoconductive detectors, Use optical excitation to study carrier dynamics in compound semiconductors, Develop advanced design techniques for microwave GaAs FET amplifiers, Improve direct method of broad band circuit design, and Explore transient carrier transport in small III-V devices in boundary limited domain.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *FIELD EFFECT TRANSISTORS, *GALLIUM ARSENIDES, *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *HETEROJUNCTIONS, *MICROWAVE AMPLIFIERS, ALLOYS, AMPLITUDE, BOUNDARIES, BROADBAND, CHARGE CARRIERS, CIRCUITS, DYNAMICS, ELECTRON GAS, EMITTERS, EXCITATION, GROWTH(GENERAL), HIGH ENERGY, HIGH RATE, LIGHT, LIMITATIONS, MATERIALS, MILLIMETER WAVES, MODELS, MODULATION, MOLECULAR BEAMS, OPTICAL COMMUNICATIONS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OPTICS, ORGANOMETALLIC COMPOUNDS, POWER, POWER EQUIPMENT, PROCESSING, QUANTUM ELECTRONICS, RECEIVERS, SEMICONDUCTORS, STRUCTURES, SUBSTRATES, THEORY, TRANSIENTS, TRANSISTORS, TRANSPORT PROPERTIES, TWO DIMENSIONAL, VAPOR PHASES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 116 7/3 7/2

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Control of the Surface Reactivity of the Si(100) Surface.

DESCRIPTIVE NOTE: Technical rept.,

87

PERSONAL AUTHORS: Yates, John T., Jr.; Bozack, M. J.; Muehlhoff, L.; Choyke, W. J.

REPORT NO. TR-15

CONTRACT NO. N00014-82-K-0280, AFOSR-82-0133

MONITOR: AFOSR
TR-87-1841

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Material Research Society Symposium Proceedings, v75 p539-550 1987.

ABSTRACT: (U) We have used molecular beam methods and temperature programmed desorption to probe the reaction of several hydrocarbons with the Si(100) surface at cryogenic temperatures. It has been found that the kinetics of the surface reaction with the C=C bond can be strongly influenced by the production of active surface sites using prebombardment with Ar ions. The chemistry of the adsorbate is also influenced by electron bombardment of the adsorbed layer. Conversely, capping of active sites with atomic hydrogen retards the kinetics of the surface reactions. Keywords: Silicon, Silicon carbide, Chemisorption, Active site, Propylene.

DESCRIPTORS: (U) *HYDROCARBONS, *SILICON, *SURFACE ACTIVE SUBSTANCES, ADSORPTION, ATOMIC STRUCTURE, BONDING, CAPPING, CHEMISORPTION, CHEMISTRY, COMPUTER PROGRAMMING, CRYOGENICS, DESORPTION, ELECTRON IRRADIATION, HYDROGEN, IONS, LAYERS, LOW TEMPERATURE, MOLECULAR BEAMS, PRODUCTION, REACTIVITIES, SILICON CARBIDES, SITES, SURFACE REACTIONS, SURFACE TEMPERATURE, SURFACES, TEMPERATURE, REPRINTS.

IDENTIFIERS: (U) WUNR413001.

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GEORGETOWN UNIV WASHINGTON D C DEPT OF MATHEMATICS

(U) Note on Boundary Stabilization of Wave Equations,

86 10P

PERSONAL AUTHORS: Lagnese, John E.

CONTRACT NO. AFOSR-86-0162

MONITOR: AFOSR
TR-87-1560

UNCLASSIFIED REPORT

ABSTRACT: (U) An energy decay rate is obtained for solutions of wave type equations in a bounded region in R superscript n whose boundary consists partly of a nontrapping reflecting surface and partly of an energy absorbing surface. Unlike most previous results on this problem, the results presented here are valid for regions *having connected* boundaries. Keywords: Wave equations, Boundary stabilization, Exponential stability.

DESCRIPTORS: (U) *WAVE EQUATIONS, *BOUNDARY VALUE PROBLEMS, BOUNDARIES, DECAY, ENERGY, ENERGY ABSORBERS, RATES, REFLECTION, STABILIZATION, SURFACES, EXPONENTIAL FUNCTIONS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 111 12/2

COLORADO UNIV AT BOULDER DEPT OF MATHEMATICS

(U) Feedback Stabilization of Distributed Systems,

87

PERSONAL AUTHORS: Hermes, Henry

CONTRACT NO. AFOSR-86-0198

MONITOR: AFOSR
TR-87-1559

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers stabilization (minimum time to the zero solution) of wave and beam equations via endpoint velocity control. In general it considers a control system described by a partial differential equation, with dependent variable denoted w=w(t,x), which admits V= the partial derivative with respect to t as a symmetry generator and hence a conservation law which implies conservation of energy.

DESCRIPTORS: (U) *CONTROL THEORY, CONTROL SYSTEMS, DIFFERENTIAL EQUATIONS, DISTRIBUTION, ENERGY, FEEDbACK, PARTIAL DIFFERENTIAL EQUATIONS, STABILIZATION, SYMMETRY, BANACH SPACE, ENERGY CONSERVATION, BOUNDARY VALUE PROBLEMS.

IDENTIFIERS: (U) Feedback control.

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BATTELLE COLUMBUS LABS RESEARCH TRIANGLE PARK NC

(U) Proceedings of the Anniversary Symposium (40th) of the Joint Services Electronics Program (JSEP) Held in Washington, D.C. on September 25, 1986.

DESCRIPTIVE NOTE: Final rept. 1 Dec 85-30 Nov 86,

JAN 87 243P

PERSONAL AUTHORS: Robb, David; Shostak, Arnold

CONTRACT NO. DAAG29-81-D-0100, AFOSR-MIPR-86-0020

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR
TR-87-1497

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with ANSER, Arlington, VA.

ABSTRACT: (U) These proceedings are those of a symposium held on 25 September 1986 at the National Academy of Sciences, Washington, D.C., to commemorate and celebrate the establishment, in 1946, of the U.S. Join Services Electronics Program (JSEP). In that year, forward-looking scientists and administration leaders at universities that had been engaged in wartime-related research, and military service agencies of the federal government, established JSEP for the purpose of carrying on university-type research of interest to all components of the military. The first of the universities involved were the Massachusetts Institute of Technology, Columbia University, Harvard University, and Polytechnic Institute of Brooklyn. These were soon followed by Stanford University, the University of California, Berkely, the Universities of Illinois, Southern California, Texas and others. There are presently 12 universities in the program, which has expanded and contracted from time to time as interest and available funds have changed.

DESCRIPTORS: (U) *ELECTRONICS, *SYMPOSIA, CALIFORNIA, FORWARD LOOKING, ILLINOIS, LEADERSHIP, MASSACHUSETTS,

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MILITARY FORCES(UNITED STATES), SCIENTISTS, SOUTH(DIRECTION), TEXAS, UNITED STATES GOVERNMENT, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A9.

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AD-A187 103 20/5

AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA

(U) A Study of the Noise Characteristics of a Voigt-Effect Coherent Forward Scattering Spectrometer,

87 10P

PERSONAL AUTHORS: Davis, L. A.; Winefordner, J. D.

CONTRACT NO. AFOSR-86-0015

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1235

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectrochimica Acta, v42B n5 p669-676 1987.

ABSTRACT: (U) Coherent forward scattering atomic spectrometry (CFS) consists of the rotation of linearly polarized light as it passes through an atomic vapor located within a transverse or a longitudinal magnetic field, the Voigt effect or the Faraday effect, respectively. A fuel rich air acetylene flame was used as the atom reservior in this study. A Glan-Foucault calcite prism polarizer placed prior to the flame, was oriented at a 45 angle to the magnetic field. A second polarizer, the analyzer, is placed after the flame to detect the amount of light which is rotated. When the analyzer is oriented orthogonally to the first polarizer, the signal produced is proportional to the square of the concentration of the analyte. The CFS signal can be linearized with the respect to concentration of offsetting the analyzer by a small offset angle. A comparison to the noise characteristics for the squared and the linear systems was made in this study. The results of the study provide valuable information in the design, evaluation and optimization of a CFS spectrometer. Keywords: Noise; Furnace; Coherent forward scatter; Voight effect; Flame; Multielement analysis.

DESCRIPTORS: (U) *FARADAY EFFECT, *ATOMIC SPECTROSCOPY, *FLAMES, ANGLES, COHERENCE, FORWARD SCATTERING, FURNACES,

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AD-A187 103 CONTINUED

LIGHT, LINEAR SYSTEMS, MAGNETIC FIELDS, NOISE, OPTIMIZATION, POLARIZATION, SPECTROMETERS, REPRINTS, ROTATION, ACETYLENE.

IDENTIFIERS: (U) *Voigt effect, Glan foucault prisms, PE61102F, WUAFOSR2303A1.

AD-A187 094 12/6

OAK RIDGE NATIONAL LAB TN

(U) On the Storage Requirement in the Out-of-Core Multifrontal Method for Sparse Factorization.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

SEP 86 17P

PERSONAL AUTHORS: Liu, Joseph W.

CONTRACT NO. AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1211

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ACM Transactions on Mathematical Software, v12 n3 p249-264 Sep 86.

ABSTRACT: (U) Two techniques are introduced to reduce the working storage requirement for the recent multifrontal method of Duff and Reid used in the sparse out-of-core factorization of symmetric matrices. For a given core size, the reduction in working storage allows some large problems to be solved without having to use auxiliary storage for the working arrays. Even if the working arrays exceed the core size, it will reduce the amount of input-output traffic necessary to manipulate the working vectors. Experimental results are provided to demonstrate significant storage reduction on practical problems using the proposed techniques. Keywords: Reprints; Cholesky factorization; Sparse matrix.

DESCRIPTORS: (U) *SPARSE MATRIX, *DATA STORAGE SYSTEMS, ARRAYS, AUXILIARY, CORES, REDUCTION, REPRINTS, REQUIREMENTS, SIZES(DIMENSIONS), PROBLEM SOLVING, EXPERIMENTAL DATA.

IDENTIFIERS: (U) Multifrontal method, PE61102F, WUAFOSR2304A3.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 093 12/1

CLEMSON UNIV SC DEPT OF MATHEMATICAL SCIENCES

(U) The Chromatic Polynomial Revisited,

86 9P

PERSONAL AUTHORS: Frank, S.; Shier, D.

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-0995

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Congressus Numerantium, v55 p57-68 1986.

ABSTRACT: (U) A nonstandard way of expressing the chromatic polynomial of an undirected graph is examined. The coefficients of the chromatic polynomial viewed in this form have interpretations not only in terms of graph-theoretic parameters but also in terms of the computational complexity of computing the chromatic polynomial. A new procedure of calculating the chromatic polynomial derives from this interpretation. Computational results with such and algorithm are also presented. Keywords: Reprints; Algorithms.

DESCRIPTORS: (U) *CHROMATICITY, *POLYNOMIALS, ALGORITHMS, COEFFICIENTS, COMPUTATIONS, GRAPHS, REPRINTS, THEORY, PARAMETERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A187 061 6/2 6/4 6/1

VERMONT UNIV BURLINGTON COLL OF MEDICINE

(U) Molecular Mechanisms of Neuronal Responsivity.

DESCRIPTIVE NOTE: Final scientific rept. 15 Jan 86-15 May 87,

JUL 87 19P

PERSONAL AUTHORS: Ehrlich, Yigal

CONTRACT NO. AFOSR-86-0089

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1463

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper lists the registrants scheduled to attend the conference and a list of papers presented in the field of Molecular mechanisms of neuronal responsivity.

DESCRIPTORS: (U) *MOLECULAR BIOLOGY, *NERVE TRANSMISSION, *NEUROCHEMISTRY, RESPONSE(BIOLOGY), PEPTIDES, PHOSPHORYLATION, NERVE CELLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 059 6/1 6/3

NEW YORK UNIV MEDICAL CENTER N Y

(U) Biophysical and Biochemical Mechanisms in Synaptic Transmitter Release.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-31 Aug 87,

SEP 87 13P

PERSONAL AUTHORS: Llinas, Rodolfo R.

CONTRACT NO. AFOSR-85-0368

PROJECT NO. 2312

TASK NO. K2

MONITOR: AFOSR
TR-87-1496

UNCLASSIFIED REPORT

ABSTRACT: (U) Four major goals were accomplished in the second year. Two related to synapsin I regulation of transmitter release and two related to the temperature dependence of the synaptic release process with a preliminary study of quantal release at the squid giant synapse. The results may be summarized as follows: (1) Demonstration that the dephosphorylated tail fragments of synapsin I do not regulate synaptic release which excludes the possibility that tail fragments themselves can prevent vesicular release. (2) Injection of head phospho synapsin I does not regulate synaptic release, demonstrating that the molecule itself does not interfere with vescular fusion. These two experiments indicate that synapsin I works by affixing the synaptic vesicles to the cytoskeletal system. (3) Video-enhanced microscopy results demonstrated that axoplasmic mobility is not altered by either tail fragments or head phospho synapsin I, confirming the findings obtained by the electrophysiological study. The results demonstrate the mechanism by which synapsin I regulates transmitter release. A study of the temperature dependence of transmitter release demonstrated that temperature can be used to study the kinetics of synapsin I inhibition of transmitter release. Measurements of miniature potentials were finally accomplished routinely and can now be utilized as a technique to determine directly the effect

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of synapsin I on single vesicular fusion. Keywords: Electrophysiology, Biochemistry, Optical Measurements, Calcium current.

DESCRIPTORS: (U) *ELECTROPHYSIOLOGY, *SYNAPSE, *NERVE TRANSMISSION, BIOCHEMISTRY, BIOPHYSICS, CALCIUM, FRAGMENTS, INJECTION, MEASUREMENT, OPTICAL PROPERTIES, TEMPERATURE, POTENTIAL ENERGY, POTENTIOMETRIC ANALYSIS.

IDENTIFIERS: (U) Synapsin 1, Quantal, Squids, *Squid giant synapse, Synaptic transmitter release.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 055 20/14 17/9

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) High-Frequency Radiowave Probing of the High-Latitude Ionosphere,

85 14P

PERSONAL AUTHORS: Greenwald, Raymond A.

CONTRACT NO. AFOSR-86-0028

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-87-1469

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in John Hopkins APL Technical Digest, v6 n1 p38-50 1985. Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) During the past several years, a program of high-frequency radiowave studies of the high latitude ionosphere has been developed. Studies are now being conducted on the formation and motion of high-latitude ionospheric electron density irregularities, using a sophisticated high-frequency radar system installed at Goose Bay, Labrador. The radar antenna is also being used to receive signals from a beacon transmitter located at Thule, Greenland. This information is providing a better understanding of the spatial and temporal variability of high-latitude propagation channels and their relationship to disturbances in the magnetosphere ionosphere system.

DESCRIPTORS: (U) *CHANNELS, *IONOSPHERE, *PROPAGATION, *RADAR ANTENNAS, *RADIO WAVES, ELECTRON DENSITY, GREENLAND, HIGH FREQUENCY, HIGH LATITUDES, RADAR.

AD-A187 055

AD-A187 047 23/3

TEXAS UNIV MEDICAL SCHOOL AT HOUSTON

(U) Analysis and Synthesis of Adaptive Neural Elements.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-31 Jul 87,

SEP 87 11P

PERSONAL AUTHORS: Byrne, John H.

CONTRACT NO. AFOSR-84-0213

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR TR-87-1567

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this research is to provide insights into the adaptive capabilities of individual neurons, which will lead to the development of machines having some of the information processing capabilities of the nervous system. During the period between 01 August 1984 and 31 July 1987, significant progress has been in three major directions. First, experimental studies on the modulation of ionic conductance mechanisms have been performed on individual neurons that are believed to contribute to neuronal plasticity and classical conditioning of defensive reflexes. Second, we have begun to identify elements of the neuronal circuit that contributes to operant conditioning of feeding behavior. Third, a single cell neuronal model for classical conditioning has been developed and simulated on a digital computer. Keywords: Learning, Memory, Information storage, Artificial intelligence.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *DATA STORAGE SYSTEMS, *NERVE CELLS, ADAPTIVE SYSTEMS, CELLS, CIRCUITS, DIGITAL COMPUTERS, EXPERIMENTAL DATA, INFORMATION PROCESSING, LEARNING, MODELS, MODULATION, NERVOUS SYSTEM, PLASTIC PROPERTIES, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

AD-A187 047

AD-A187 046 12/1

KENT STATE UNIV OHIO

(U) Investigation on Improved Iterative Methods for Solving Sparse Systems of Linear Equations.

DESCRIPTIVE NOTE: Final technical rept. Jul 84-Jul 85,

85 5P

PERSONAL AUTHORS: Varga, Richard S.

CONTRACT NO. AFOSR-84-0234

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1465

UNCLASSIFIED REPORT

ABSTRACT: (U) This effort involved research investigating improved iterative methods for solving sparse systems of linear equations. Research papers appearing in print during this period included such titles as On the minimum module of normalized polynomials, Extended numerical computations on the 1/9 conjecture in rational approximation Theory, and A study of semi-iterative methods for nonsymmetric systems of linear equations. A major accomplishment during this period of effort was the use of summability methods and conformal mapping techniques in the study of iterative methods, thus enhancing the theoretical foundations of such methods.

DESCRIPTORS: (U) *ITERATIONS, APPROXIMATION(MATHEMATICS), ASYMMETRY, COMPUTATIONS, CONFORMAL MAPPING, LINEAR ALGEBRAIC EQUATIONS, NUMERICAL ANALYSIS, POLYNOMIALS, THEORY.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

AD-A187 046

AD-A187 038 12/5 12/2 12/9

OAK RIDGE NATIONAL LAB TN

(U) Computational Models and Task Scheduling for Parallel Sparse Cholesky Factorization.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

OCT 86 18P

PERSONAL AUTHORS: Liu, Joseph W.

CONTRACT NO. DE-AC05-84OR21400, $AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1210

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Parallel Computing, v3 n4 p327-342 Oct 86.

ABSTRACT: (U) In this paper, a systematic and unified treatment of computational task models for parallel sparse Cholesky factorization is presented. They are classified as fine-, medium-, and large-gained graph models. In particular, a new medium-grained model based on column-oriented tasks is introduced, and it is shown to correspond structurally to the filled graph of the given sparse matrix. The task scheduling problem for the various task graphs is also discussed. A practical algorithm to schedule the column tasks of the medium-grained model for multiple processors is described. It is based on a heuristic critical path scheduling method. This will give an overall scheme for parallel sparse Cholesky factorization, appropriate for parallel machines with shared-memory architecture like the Denelcor HEP.

DESCRIPTORS: (U) *ALGORITHMS, *GRAPHS, *SCHEDULING, *PARALLEL PROCESSING, *COMPUTER ARCHITECTURE, FILLING, MACHINES, MATHEMATICAL MODELS, MULTIPROCESSORS, REPRINTS, SPARSE MATRIX, HEURISTIC METHODS.

IDENTIFIERS: (U) Cholesky factorization, PE61102F, WUAFOSR2304A3.

AD-A187 038

AD-A187 020 12/1

OAK RIDGE NATIONAL LAB TN

(U) Symbolic Cholesky Factorization on a Local-Memory Multiprocessor.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

87 12P

PERSONAL AUTHORS: George, Alan; Heath, Michael T.; Ng, Esmond; Liu, Joseph

CONTRACT NO. AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Parallel Computing, v5 p85-95 1987.

ABSTRACT: (U) This reprint presents a parallel algorithm for symbolic Cholesky factorization of sparse symmetric matrices. The symbolic factorization algorithm complements a parallel numeric factorization algorithm published earlier. The implementation is designed for a message-passing, distributed-memory multiprocessor. In addition to discussing the basic algorithm and data structures required, the authors also describe two enhancements that improve performance. Empirical test results obtained on an Intel iPSC hypercube are given.

DESCRIPTORS: (U) *ALGORITHMS, *SPARSE MATRIX, DATA BASES, NUMBERS, PARALLEL ORIENTATION, REPRINTS, SYMBOLS, SYMMETRY, COMPUTATIONS, MULTIPROCESSORS.

IDENTIFIERS: (U) *Cholesky factoriztaion, PE61102F, WUAFOSR21304A3.

AD-A187 020

AD-A187 018 7/3

IDAHO UNIV MOSCOW

(U) Syntheses of (Difluoroamino)Difluoroacetonitrile, Syn-Fluoro(Fluoroimino)Acetonitrile, and Syn-3,3,3-Trifluoro-2-(Fluoroimino)Propanenitrile and Their Reactions with Chlorine Fluoride. Syntheses of New Perfluorinated Diazines.

DESCRIPTIVE NOTE: Journal article,

87 6P

PERSONAL AUTHORS: Marsden, Helen M.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-82-0247

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1185

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v26 n1 p169-172 1987.

ABSTRACT: (U) Highly fluorinated nitrogen compounds that contain the -NF2, -NC12-NFC1, and/or-N=N- functionalities are very reactive synthetic reagents and are potentially explosive materials. Tetrafluorohydrazine, N2F4, has had a major impact on the development of the fluoronitrogen field. Of particular interest are the reactions of N2F4 with certain olefins that when carried out the presence of an alkali-metal fluoride gave (fluoroimino) acetonitriles. The reactions of these fluoroimino nitriles and related compounds with nucleophiles have been studied in detail, with use of such species as NH3, HN3, RONa, C2H5NH2, (C2H5)2NH, and C2H5OH5. However, addition reactions to both the cyano and the >C=NF bonds in these compounds have not been stuided. Chlroine fluoride added readily across carbon-nitrogen multiple bonds; e.g., when it was added to trifluoroacetonitrile, dichloro(pentafluoroethyl)amine resulted. Such dichloro(perhalalkyl)amines are useful synthetic reagents, and many compounds of the type RfNC12 adn RfNF21 have been prepared.

AD-A187 018

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A187 020 12/1

OAK RIDGE NATIONAL LAB TN

(U) Symbolic Cholesky Factorization on a Local-Memory Multiprocessor.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87.

87 12P

PERSONAL AUTHORS: George, Alan; Heath, Michael T.; Ng, Esmond; Liu, Joseph

CONTRACT NO. AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Parallel Computing, v5 p85-95 1987.

ABSTRACT: (U) This reprint presents a parallel algorithm for symbolic Cholesky factorization of sparse symmetric matrices. The symbolic factorization algorithm complements a parallel numeric factorization algorithm published earlier. The implementation is designed for a message-passing, distributed-memory multiprocessor. In addition to discussing the basic algorithm and data structures required, the authors also describe two enhancements that improve performance. Empirical test results obtained on an Intel iPSC hypercube are given.

DESCRIPTORS: (U) *ALGORITHMS, *SPARSE MATRIX, DATA BASES, NUMBERS, PARALLEL ORIENTATION, REPRINTS, SYMBOLS, SYMMETRY, COMPUTATIONS, MULTIPROCESSORS.

IDENTIFIERS: (U) *Cholesky factoriztaion, PE61102F, WUAFOSR21304A3.

AD-A187 020

AD-A187 018 7/3

IDAHO UNIV MOSCOW

(U) Syntheses of (Difluoroamino)Difluoroacetonit Fluoro(Fluoroimino)Acetonitrile, and Syn-3,3 Trifluoro-2-(Fluoroimino)Propanenitrile and Reactions with Chlorine Fluoride. Syntheses Perfluorinated Diazines.

DESCRIPTIVE NOTE: Journal article,

87 6P

PERSONAL AUTHORS: Marsden, Helen M.; Shreeve,

CONTRACT NO. AFOSR-82-0247

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1185

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemis p169-172 1987.

ABSTRACT: (U) Highly fluorinated nitrogen contain the -NF2, -NC12-NFC1, and/or-N=N- f are very reactive synthetic reagents and ar explosive materials. Tetrafluorohydrazine, a major impact on the development of the f field. Of particular interest are the react with certain olefins that when carried out of an alkali-metal fluoride gave (fluoroim acetonitriles. The reactions of these fluo nitriles and related compounds with nucleo been studied in detail, with use of such HN3, RONa, C2H5NH2, (C2H5)2NH, and C2H5OH addition reactions to both the cyano and in these compounds have not been stuided. fluoride added readily across carbon-nitr bonds; e.g., when it was added to trifluo dichloro(pentafluoroethyl)amine resulted, dichloro(perhalalkyl)amines are useful sy and many compounds of the type RfNC12 ad been prepared.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 957 12/6

OAK RIDGE NATIONAL LAB TN

(U) Gaussian Elimination with Partial Pivoting and Load Balancing on a Multiprocessor.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

87 11P

PERSONAL AUTHORS: Chu, Eleanor; George, Alan

CONTRACT NO. DE-AC05-840R21400, $AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1207

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Parallel Computing 5, p65-74 1987.

ABSTRACT: (U) A row oriented implementation of Gaussian elimination with partial pivoting on a local-memory multiprocessor is described. In the absence of pivoting, the initial data loading of the node processors leads to a balanced computation. However, if interchanges occur, the computational loads on the processors may become unbalanced, leading to inefficiency. A simple load-balancing scheme is described which is inexpensive and which maintains computational balance in the presence of pivoting. Using some reasonable assumptions about the probability of pivoting occuring, an analysis of the communication costs of the algorithm is developed, along with an analysis of the computation performed in each node processor. This model is then used to derive the expected speedup of the algorithm. Finally, experiments using Intel hypercube are presented in order to demonstrate the extent to which the analytical model predicts the performance.

DESCRIPTORS: (U) *MULTIPROCESSORS, *MEMORY DEVICES, ALGORITHMS, COMPUTATIONS, BALANCE, NODES, PROCESSING EQUIPMENT, MATHEMATICAL MODELS, COSTS, DATA PROCESSING, COMPUTER COMMUNICATIONS.

AD-A186 957

AD-A186 957 CONTINUED

IDENTIFIERS: (U) Gaussian elimination, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 891 7/5 20/5 20/9

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Laser Ablation for the Introduction of Solid Metals into an Inductively Coupled Plasma,

87 9P

PERSONAL AUTHORS: Tremblay, M. E.; Smith, B. W.; Leong, M. B.; Winefordner, J. D.

CONTRACT NO. AFOSR-86-0015

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1236

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectroscopy Letters, v20 n4 p311-318 1987.

ABSTRACT: (U) The direct introduction of solid samples into an inductively coupled plasma (ICP) has been studied using ablation of metals by a focused XeCl excimer laser. The laser pulses form a very energetic microplasma at the metal surface from which the ablated species are carried into a stream of argon and are detected using a gated integrator/boxcar averager. This method is applied to the analysis of Ni and Cr in stainless steels. Keywords: Laser, Ablation. Xenon, Chlorides.

DESCRIPTORS: (U) *ABLATION, *LASER PUMPING, *CHEMICAL ANALYSIS, ARGON, CHLORIDES, COUPLING(INTERACTION), LIGHT PULSES, METALS, PLASMAS(PHYSICS), SAMPLING, SOLIDS, STAINLESS STEEL, SURFACES, XENON, EXCIMERS, EMISSION SPECTRA, NICKEL, CHROMIUM, REPRINTS.

IDENTIFIERS: (U) Inductivity coupled plasmas, Xenon chloroide lasers, PE61102F, WUAFOSR2303A1.

AD-A186 890 20/6 7/4

DANISH ATOMIC ENERGY COMMISSION ROSKILDE ACCELERATOR SECTION

(U) Study of Chemical Reactions by Surface Second Harmonic Generation: p-Nitrophenol at the Air-Water Interface,

JUL 87 3P

PERSONAL AUTHORS: Bhattacharyya, Kankan; Sitzmann, E. V.; Eisenthal, K. B.

CONTRACT NO. AFOSR-84-0013

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1507

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Phyics, v87 n2 p1442-1443, 15 Jul 87.

ABSTRACT: (U) In recent years, optical second harmonic generation (SHG) has been shown to provide valuable new information on a number of interfacial properties. Since SHG is electric dipole forbidden in the bulk, this technique can be used to probe selectively the interfacial layer between two centrosymmetric media. Thus a wide variety of surfaces have been studied by this technique; a substantial amount of knowledge has been gathered about concentration, orientation, and spectroscopy of the species at the interfaces.

DESCRIPTORS: (U) *AIR WATER INTERACTIONS, *CHEMICAL REACTIONS, *HARMONIC GENERATORS, *INTERFACES, *SPECTROSCOPY, LAYERS, OPTICAL PROPERTIES, SURFACES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 888 14/2

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Continuous-Time Least-Squares Fast Transversal Filters,

APR 87

PERSONAL AUTHORS: Levi-Ari, H.; Cioffi, J. M.; Kailath, T.

CONTRACT NO. N00014-85-K-0612, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1149

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Conference on *Acoustic and Signal Processing*, p415-418 Apr 87.

ABSTRACT: (U) A recursive-least-squares (RLS) adaptive fast transversal filter (FTF) for processing of continuous-time signals is presented. It has the same structure as the discrete-time-least-squares FTF, namely, a tapped-delay-line with time-varying gains, which are updated by propagating a set of coupled recursions. However, while the discrete-time scheme involves a fundamental unit of time (i.e., the sampling period of the signal), which determines both the duration of the delay and the rate of gain updating, our continuous-time scheme involves a delay of arbitrary duration and continuously-varying gains. Also, the conceptual and computational complexity of the continuous-time FTF is reduced in comparison to the to that of the discrete-time FTF.

DESCRIPTORS: (U) *ADAPTIVE FILTERS, *COMPUTATIONS, *DELAY, *SAMPLING, ELECTROMAGNETIC WAVE FILTERS, GAIN, RATES, TIME, TIME INTERVALS, TRANSVERSE WAVES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A186 888

AD-A186 880 4/2

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY

(U) Snow Cover as an Indicator of Climate Change,

AUG 87 12P

PERSONAL AUTHORS: Robinson, David A.

CONTRACT NO. AFOSR-86-0053

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-87-1502

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Vancouver Symposium, p15-25 Aug 87.

ABSTRACT: (U) January snow cover in portions of the Midwest and Great Plains of the United States has shown significant variations during this century on year-to-year and long-term time frames. Over the past forty years, snow cover has increased in each region. This trend began in the late 1920's in the Plains, while in the Midwest the recent trend was preceded by several decade-long oscillations. Snow cover data used in the analysis included nearly complete records from twenty ground stations between 1901 and 1978 and weekly satellite-derived charts between 1967 and 1986. There is a reasonable agreement between regional analyses made with each of the independent data sets for the 1967-1978 interval. There appears to be a positive relationship between colder and snowier-than-normal and warmer-than-normal and relatively snow-free Januaries.

DESCRIPTORS: (U) *SNOW COVER, ARTIFICIAL SATELLITES, CHARTS, CLIMATE, DATA BASES, GROUND STATIONS, INDICATORS, LONG RANGE(TIME), REPRINTS, TIME INTERVALS, UNITED STATES VARIATIONS.

IDENTIFIERS: (U) *Climate change, PE61102F, WUAFOSR2310A1.

AD-A186 880

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 872 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Schur Convexity of the Maximum Likelihood Function for the Multivariate Hypergeometric and Multinomial Distributions,

AUG 87 7P

PERSONAL AUTHORS: Boland, Philip J.; Proschan, Frank

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1532

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Statistics and Probability Letters, v5 p317-322 Aug 87.

ABSTRACT: (U) The authors define for certain family distributions the maximum liklihood function L at a sample point x, It is shown that for the multivariate hypergeometric and multinomial families, the maximum likelihood function is a Schur convex function of x. In the language of majorization, this implies that the more diverse the elements or components of x are, the larger is the function L(x). Several applications of this result are given in the areas of parameter estimation and combinatorics. An improvement and generalization of a classical inequality of Khintchine is also derived as a consequence.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, ESTIMATES, PARAMETERS, REPRINTS, HYPERGEOMETRIC FUNCTIONS, INEQUALITIES.

IDENTIFIERS: (U) Convex functions, Schur functions, Khintchine inequality, PE61102F, WUAFOSR2304A5.

AD-A186 872

AD-A186 871 12/4

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) A Note on the Effect of Preemptive Policies on the Stability of a Priority Queue,

87 6P

PERSONAL AUTHORS: Marie, Raymond; Trivedi, Kishor S.

CONTRACT NO. AFOSR-84-0132

MONITOR: AFOSR
TR-87-1515

UNCLASSIFIED REPORT

ABSTRACT: (U) We study the stability condition of an M/G/1 priority queue with two classes of jobs. Class 1 jobs have preemptive priority over class 2 jobs. We consider three different types of preemptions and the effects of possible work loss (due to preemption) on the stability condition for the queueing system. Keywords: Priority queue, Preemptive scheduling, Stability condition, Reprints.

DESCRIPTORS: (U) *QUEUEING THEORY, LOSSES, POLICIES, REPRINTS, STABILITY, SCHEDULING, RANDOM VARIABLES, MATHEMATICAL MODELS.

AD-A186 871

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 865 7/2

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Rotational, Vibrational and Electronic Excitation of a Neutral Nitrogen Molecule in the ICP (Inductively Coupled Argon Plasma),

87

PERSONAL AUTHORS: Hasegawa, T.; Winefordner, J. D.

CONTRACT NO. AFOSR-86-0015

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-87-1237

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectrochimica Acta, v42B n5 p651-663 1987.

ABSTRACT: (U) Diagnostics of nitrogen molecules in the inductively coupled argon plasma (ICP) have been evaluated with respect to collisional processes with electrons, argon atoms, and nitrogen molecules. Based on reaction probabilities, defined as the product of the rate coefficient and number density of colliding species, argon collisions were proposed as the dominant excitation mechanism for rotational transitions of N, while vibrational transitions showed complex behaviour depending upon the vibrational quantum number. Furthermore, the excitation mechanism for electronic levels was considered by applying the collisional-radiative model including heavy particle collisions, such as mutual N impact and Penning processes. Keywords: Nitrogen, Vibrational excitation, Rotational excitation, Electronic excitation, Penning ionization, Electron impact, Temperature.

DESCRIPTORS: (U) *ELECTRON ENERGY, *NITROGEN, *PLASMAS(PHYSICS), ARGON, ATOMS, COEFFICIENTS, COLLISIONS, COUPLING(INTERACTION), DENSITY, DIAGNOSIS(GENERAL), ELECTRON IMPACT SPECTRA, ELECTRONS, ENERGY LEVELS, EXCITATION, IMPACT, IONIZATION, MOLECULES, NEUTRAL, PROBABILITY, QUANTUM THEORY, RATES, RESPONSE, ROTATION,

AD-A186 865 CONTINUED

TRANSITIONS, VIBRATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 860 12/2

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Transient Analysis of Acyclic Markov Chains,

87

PERSONAL AUTHORS: Marie, Raymond A.; Reibman, Andrew L.; Trivedi, Kishor S.

CONTRACT NO. DAAG29-84-K-0045, $AFOSR-84-0132

MONITOR: AFOSR, ARO
TR-87-1519, 21055.25-EL

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Performance Evaluation, v7 p175-194 1987.

ABSTRACT: (U) Continuous-time Markov chains are commonly used in system reliability modeling. This reprint discusses a method for automatically deriving transient solutions that are symbolic in t for acyclic Markov chains. Our method also includes parametric sensitivity analysis of the transient solution and several cumulative measures associated with Markov chain behavior. We include three examples, one to show the use of our method in evaluating approximate solution techniques, one showing parametric sensitivity analysis of a large Markov model, and one demonstrating the computation of cumulative measures for an acyclic Markov reward process. Keywords: Accumulated reward; Acyclic markov chain; Markov chain; Markov reward process; Mean time to failure; Performability analysis; Reliability modeling; Sensitivity analysis; Transient analysis.

DESCRIPTORS: (U) *MARKOV PROCESSES, *MATHEMATICAL MODELS, *RELIABILITY, BEHAVIOR, CHAIN REACTIONS, COMPUTATIONS, CONTINUITY, FAILURE, MEAN, MODELS, PARAMETRIC ANALYSIS, REPRINTS, SOLUTIONS(GENERAL), TIME, TIME DEPENDENCE, TRANSIENTS.

AD-A186 860

AD-A186 858 10/2 20/12

GA TECHNOLOGIES INC SAN DIEGO CA

(U) Variable Band Gap Materials for Thermophotovoltaic Generators.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 86-31 Aug 87,

AUG 87 66P

PERSONAL AUTHORS: Woolf, Lawrence D.; Duggan, Dennis M.; Smith, Joe N., Jr

REPORT NO. GA-A18953

CONTRACT NO. F49620-86-C-0043

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-87-1537

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research program was to design and develop direct band gap solar cells which would have high below band gap energy (infra-red (IR)) reflectivity for use in high efficiency thermophotovoltaic (TPV) energy conversion systems. Two types of customized GaAs cells were grown on intrinsic or semi-insulating GaAs substrates with either p-type GaAs or Al(.9) Ga (.1) As stop-etch layers. Holes were drilled through the substrate using a laser photochemical etch technique. Cells with high IR reflectivity and low series resistance were fabricated by drilling a hole which stopped at the contact layer of the cell with the Al(.9) Ga(.1) As stop-etch layer and then depositing gold in the hole and on the back surface. Measurements of these customized cells indicate that IR reflectivities in excess of 90%, corresponding to TPV efficiencies in excess of 35%, are feasible. Keywords include: Thermophotovoltaic energy conversion; GaAs solar cells; Photochemical etching; GaAs; Free carrier absorption; and Infra-Red reflectivity.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *P TYPE

AD-A186 858

AD-A186 858 CONTINUED

SEMICONDUCTORS, *SOLAR CELLS, *SUBSTRATES, ABSORPTION, CELLS, EFFICIENCY, ENERGY CONVERSION, ETCHING, HIGH RATE, INFRARED RADIATION, INSULATION, LASERS, LAYERS, PHOTOCHEMICAL REACTIONS, REFLECTIVITY, RESISTANCE, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

AD-A186 846 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) The Phase of Second-Harmonic Light Generated at an Interface and Its Relation to Absolute Molecular Orientation,

NOV 86 7P

PERSONAL AUTHORS: Kemnitz, K.; Bhattacharyya, K.; Hicks, J. M.; Pinto, G. R.; Eisenthal, K. B.

CONTRACT NO. AFOSR-84-0013

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1508

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Chemical Physics Letters*, v131 n4/5 p285-290, 14 Nov 86.

ABSTRACT: (U) Measurement of the absolute phase of the surface second-harmonic light field respect to the pump field. i.e., the phase of the surface non-linear susceptibility is described. From such studies the absolute orientation of surface molecules can be determined. In the present work the liquid/vapor interface of an aqueous phenol solution was investigated. (Reprints)

DESCRIPTORS: (U) *MOLECULES, *ORIENTATION(DIRECTION), *PHENOLS, INTERFACES, LIQUIDS, NONLINEAR SYSTEMS, PUMPS, REPRINTS, SOLUTIONS(MIXTURES), SURFACES, VAPORS, WATER.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 844 12/6

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) A Performability Analysis of Two Multi-Processor Systems,

JUL 87

PERSONAL AUTHORS: Smith, R. M.; Trivedi, K. S.

CONTRACT NO. AFOSR-84-0132, DAAG29-84-K-0045

MONITOR: AFOSR, ARO
TR-87-1520, 21055.26-EL

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the International Symposium on Fault-Tolerant Computing (17th) p224-229, 6-8 Jul 87.

ABSTRACT: (U) Multiple-processor systems can provide higher performance and higher reliability/availability than single processor systems. In order to properly assess the effectiveness of multiprocessor systems, measures that combine performance and reliability are needed. We describe the behaviour of the multiprocessor system as a continuous time Markov chain and associate a reward rate (performance measure) with each state. We evaluate the distribution of performability for analytical models of two multi-processor systems using a recently developed polynomial-time algorithm that obtains the distribution of performability for non-repairable as well as repairable systems with heterogeneous components. The systems that we analyze are the (C.mmp) multi-processor system developed at Carnegie Mellon University and a shared storage system proposed by researchers at the IBM Watson Research Center. These examples indicate that distributions of cumulative performance measures over finite intervals reveal behavior of multi-processor systems not indicated by the steady-state-values alone.

DESCRIPTORS: (U) *ALGORITHMS, *MATHEMATICAL MODELS, *MULTIPROCESSORS, AVAILABILITY, BEHAVIOR, HETEROGENEITY, INTERVALS, MARKOV PROCESSES, POLYNOMIALS, PROCESSING EQUIPMENT, RELIABILITY, REPAIR, REPRINTS, RESEARCH FACILITIES, SHARING, STEADY STATE, STORAGE, TIME.

AD-A186 844

AD-A186 835 8/12 8/3

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY

(U) Large-Scale Patterns of Snow Melt on Arctic Sea Ice Mapped from Meteorological Satellite Imagery,

87 7P

PERSONAL AUTHORS: Scharfen, G.; Barry, R. G.; Robinson, D. A.; Kukla, G.; Serreze, M. C.

CONTRACT NO. AFOSR-86-0053, $NSF-ATM83-18676

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-87-1501

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annals of Glaciology, v9 p1-6 1987.

ABSTRACT: (U) The seasonal progression of snow melt on Arctic pack ice is mapped from satellite shortwave imagery (0.4-1.1 micrometers) for four spring/summer seasons (1977, 1979, 1984 and 1985). This provides the first detailed information on the temporal change of the ice surface albedo in summer and of its year-to-year variability. Average surface albedo of the Arctic Basin for the years investigated falls from between 0.75 and 0.80 in early May to between 0.35 and 0.45 in late July and early August. In the central Arctic, where ice concentration remains high and 0.50 to 0.60. Overall, melt progresses poleward from the Kara and Barents Seas and from the southern Beaufort and Chukchi Seas, with the melt fronts meeting on the American side of the Pole. There are substantial year-to-year differences in timing, duration and extent of the melt interval. Progression of melt in May and June of the earliest melt year (1977) was about 3 weeks ahead of the latest year (1979). By late July, the central Arctic was essentially snow free in 1977 to 1979, but more than 50% snow covered in 1984.

DESCRIPTORS: (U) *PACK ICE, *SEA ICE, ALBEDO, ARCTIC OCEAN, ARCTIC REGIONS, CHUKCHI SEA, ICE FORMATION, INFRARED IMAGES, INTERVALS, MELTING, MELTS,

AD-A186 835

AD-A186 835 CONTINUED

METEOROLOGICAL SATELLITES, PATTERNS, SATELLITE PHOTOGRAPHY, SNOW, SOUTH(DIRECTION), SPRING SEASON, SUMMER, SURFACES, KARA SEA, BARENTS SEA, BEAUFORT SEA, VISIBLE SPECTRA, SNOW COVER, SEASONAL VARIATIONS, REPRINTS, ICE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

AD-A186 834 6/1 6/4 5/8

CITY OF HOPE BECKMAN RESEARCH INST DUARTE CA

(U) Long Term Synaptic Plasticity and Learning in Neuronal Networks.

DESCRIPTIVE NOTE: Annual technical rept. 15 Aug 86-14 Aug 87,

SEP 87 7P

PERSONAL AUTHORS: Brown, Thomas H.

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR TR-97-1477

UNCLASSIFIED REPORT

ABSTRACT: (U) The working hypothesis has been that longterm synaptic potentiation may mediate certain of the mnemonic functions of the hippocampal circuitry. The discovery of an underlying Hebbian conjunctive mechanism has boosted confidence in this hypothesis. One major effort of the past year was to summarize and integrate this AFOSR supported discovery into a more general theoretical and experimental framework. In regard to the 4 specific aims, development of the fluctuation algorithm has been completed, and it was applied to synaptic fluctuations obtained using the loose patch clamp method (aim 2). THe algorithm is currently running on a mainframe at UCLA. It is now being implemented on a small workstation (Macintosh II). As soon as it is working on the Mac II, the quantal analysis in hippocampus will begin (aim 1). The culture method is underway (aim 3) and a first-generation video microscopic technique was developed for visualizing neurons and their synapses to see if the latter move during activity (aim 4).

DESCRIPTORS: (U) *NERVE CELLS, *SYNAPSE, *LEARNING, *NEURAL NETS, ALGORITHMS, HIPPOCAMPUS, HYPOTHESES, LEARNING, MICROSCOPY, MNEMONICS, NETWORKS, PLASTIC PROPERTIES, PROTOTYPES, VARIATIONS, VIDEO SIGNALS, WORK, NEUROPHYSIOLOGY, NERVE TRANSMISSION, CULTURES(BIOLOGY), BIOPHYSICS, MOLECULAR BIOLOGY.

AD-A186 835

AD-A186 834

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 834 CONTINUED

IDENTIFIERS: (U) *Synaptic potential, Synaptic plasticity, Patch lamp method.

AD-A186 829 9/3

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) Solid Solubility in Laser Cladding,

FEB 87 8P

PERSONAL AUTHORS: Mazumder, J.; Kar, A.

REPORT NO. LAMP-AF01

CONTRACT NO. AFOSR-85-0333

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-1239

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Metals, v9 n2 p18-23 Feb 87.

ABSTRACT: (U) Laser cladding techniques have recently enjoyed attention in preparing in-situ novel surface clad alloys with extended solid solution. Mass transport involved in this process is rather intriguing since it plays the major role in producing new materials without being restricted by equilibrium phase diagram. Although earlier work has identified convection as the dominant factor for homogenous liquid metal composition, very little is understood about the solute redistribution at the solid-liquid interface under such nonequilibrium conditions. In this paper a mathematical model is presented for determining the composition of extended solid solutions formed due to rapid cooling in laser cladding. This model considers a diffusion mechanism for mass transport in a one-dimensional semi-finite solid substrate. The rate of solidification was obtained by modeling the cooling process as a composite medium heat transfer problem, and the discontinuity of the concentration field was simulated using nonequilibrium partition coefficient. A nonsimilar exact solution for the mass transport equation was obtained using a set of similarity variables derived using Lie group theory.

AD-A186 834

AD-A186 829

AD-A186 829 CONTINUED

DESCRIPTORS: (U) *CLADDING, *LASERS, ALLOYS, COEFFICIENTS, CONVECTION, COOLING, DIFFUSION, DISTRIBUTION, EQUATIONS, GROUPS(MATHEMATICS), HIGH RATE, INTERFACES, LIE GROUPS, LIQUIDS, MASS TRANSFER, MATHEMATICAL MODELS, PHASE DIAGRAMS, RATES, SOLID SOLUTIONS, SOLIDIFICATION, SOLIDS, SOLUBILITY, SOLUTES, SURFACES, TRANSPORT PROPERTIES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A186 829

AD-A186 826 6/1 6/4

CITY OF HOPE BECKMAN RESEARCH INST DUARTE CA DIV OF NEUROSCIENCES

(U) Conductance Mechanism Responsible for Long-Term Potentiation in Monosynaptic and Isolated Excitatory Synaptic Inputs to Hippocampus,

86 12P

PERSONAL AUTHORS: Barrionuevo, German; Kelso, Stephen R.; Johnston, Daniel; Brown, Thomas H.

CONTRACT NO. F49620-86-C-0099

MONITOR: AFOSR TR-87-1379

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Neurophysiology v55 n3 p540-550 1986.

ABSTRACT: (U) 1) The biophysical mechanisms underlying long term potentiation (LTP) were investigated in indentifiable and monosynaptic excitatory inputs to hippocampal neurons. The results provide the first insights into the conductance changes that are responsible for the expression of LTP. 2) Both current- and voltage-clamp measurements of the mossy fiber synaptic response in pyramidal neurons of region CA3 were made with a single-electrode-clamp system. The excitatory postsynaptic response was pharmacologically isolated by bathing hippocampal slices in saline containing picrotoxin, which blocks the synaptic inhibition that normally accompanies the experimentally evoked mossy fiber response. LTP was induced by tetanically stimulating the mossy fiber input of 1 s at 100 Hz. Before and 20 min to 1 h after inducing LTP, we attempted to measure the mean excitatory postsynaptic potential (EPSP) amplitude intrasomatic current-voltage relationship to a step current waveform, membrane time constant spike threshold peak excitatory postsynaptic current amplitude synaptic conductance increase and synaptic reversal potential but adequate assessments of all eight of these were not always obtained for every cell that was studied.

DESCRIPTORS: (U) *HIPPOCAMPUS, *SYNAPSE, *NERVE

AD-A186 826

AD-A186 826 CONTINUED

TRANSMISSION, BIOPHYSICS, CONDUCTIVITY, ELECTRIC CURRENT, FIBERS, INHIBITION, INPUT, NERVE CELLS, REVERSIBLE, VOLTAGE, WAVEFORMS, RESPONSE(BIOLOGY), NEUROPHYSIOLOGY, REPRINTS.

IDENTIFIERS: (U) *Synaptic potential, Current clamp measurement, Voltage clamp measurements, Pyramidal neurons.

AD-A186 826

AD-A186 822 9/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES CENTER FOR LASER STUDIES

(U) Studies on Nonlinear Mechanisms of Excimer Laser Propagation in Fused Silica Fibers.

DESCRIPTIVE NOTE: Final rept. 1 May 85-30 Apr 87,

JUL 87 40P

PERSONAL AUTHORS: Garmire, Elsa

REPORT NO. CLS-87-15

CONTRACT NO. AFOSR-85-0197

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-87-1372

UNCLASSIFIED REPORT

ABSTRACT: (U) This study was to investigate the potential for short wavelength generation through Raman up conversion in ultraviolet transmitting fibers. The study resulted in three key achievements: 1. Identification of induced absorption in fused silica UV fibers due to color center formation with the excimer laser at 193 nm. Optical bleaching to reverse the induced absorption was observed by using a longer wavelength of the excimer laser (XeF at 351 nm). A maximum recovery of 70% of initial transmission was obtained. This is the first time that color center formation and subsequent bleaching has been reported in UV transmitting fibers. 2. Development of new means to image single pulses from the excimer laser, utilizing a phosphor to down convert the image to videorecorder. 3. Study of Raman up conversions using excimer lasers. Comparison was made of fibers vs. Raman resonators. Limited coherence length because of the bandwidth spread of excimer lasers and unavailability of low-mode-number UV fibers are reasons why the Raman resonator appears to be a reasonable approach.

DESCRIPTORS: (U) *EXCIMERS, *FIBERS, *FUSED SILICA, ABSORPTION, COHERENCE, COLOR CENTERS, IDENTIFICATION,

AD-A186 82

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 822 CONTINUED

IMAGES, LASER BEAMS, LASERS, LENGTH, LIGHT TRANSMISSION, NONLINEAR SYSTEMS, PULSES, RAMAN SPECTRA, RESONATORS, SHORT WAVELENGTHS, TRANSMITTING, ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A186 822

AD-A186 807 11/4

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Sublaminate Damage Mechanisms in Composite Structures.

DESCRIPTIVE NOTE: Final rept. 15 Apr 85-14 Apr 87,

JUL 87 44P

PERSONAL AUTHORS: Rehfield, Lawrence W.; Armanios, Erian A.

CONTRACT NO. AFOSR-85-0179

PROJECT NO. 2302

TASK NO. 82

MONITOR: AFOSR TR-87-1450

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes the objectives and accomplishments of research on sublaminate damage mechanisms in composite structures. It may be separated into three elements. The first is interlaminar fracture analysis methodology development. Existing methods for predicting strain energy release rate components have been assessed, and two new alternative approaches have been developed and illustrated. The second is the creation of a phenomenologically based criterion for damage tolerance analysis of composite structures. An equivalent damage parameter and a relevant compliance measure are determined from experiments. This methodology has been validated by seven independent experiments. Keywords: Delamination, Damage tolerance, Damage in composites, Composite materials.

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *DAMAGE ASSESSMENT, *LAMINATES, COMPOSITE MATERIALS, DAMAGE, ENERGY TRANSFER, STRAIN RATE, TOLERANCE, FRACTURE(MECHANICS), STRAIN RATE, PEEL STRENGTH, MATHEMATICAL PREDICTION, MICROCRACKING.

IDENTIFIERS: (U) Delaminatin, Fracture analysis, PE61102F, WUAFOSR2230282.

AD-A186 807

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 793 12/6 9/1 13/8

CLARKSON UNIV POTSDAM NY DIV OF RESEARCH

(U) Interdisciplinary Research in Applied Mathematics.

DESCRIPTIVE NOTE: Final rept. 15 Aug 86-14 Aug 87,

JUL 87 44P

PERSONAL AUTHORS: Barouch, Eytan

CONTRACT NO. AFOSR-86-0249

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-87-1204

UNCLASSIFIED REPORT

ABSTRACT: (U) The SUN system was ordered in September 1986. After long delays in production, the system was partially delivered in January-February 1987. The system was installed within two weeks and became functional in April-May 1987. Due to reduced amount of funds granted ($150,000) a supplementary fund was obtained from the National Science Foundation ($30,000) and Clarkson University has contributed $20,000 as well, With these combined funds the system was made functional, after an ethernet installation. Several achievements can already be reported by the use of the SUN system despite its short service time.

DESCRIPTORS: (U) *DIGITAL COMPUTERS, *FABRICATION, *INTEGRATED CIRCUITS, APPLIED MATHEMATICS, PRODUCTION, SHORT RANGE(TIME), TEXT PROCESSING, COMPUTER COMMUNICATIONS, PHOTOLITHOGRAPHY, X RAYS.

IDENTIFIERS: (U) Sun computer systems, Local area networks, Nysernet computer network, VLSI(Very Large Scale Integration), CEF(Contrast Enhancing Film), Prolith computer program, CEL(Contrast Enhanced Lithography), Word processing, PE61102F, WUAFOSR2917A5.

AD-A186 793

AD-A186 792 20/3 20/14 20/9

CLARKSON UNIV POTSDAM NY DIV OF RESEARCH

(U) Advanced Studies of Integrable Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jun 82-30 Sep 86,

DEC 86 5P

PERSONAL AUTHORS: Kaub, David J.

CONTRACT NO. AFOSR-82-0154

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-87-1412

UNCLASSIFIED REPORT

ABSTRACT: (U) Soliton Dynamics in the Presence of External Forces: a recent conjecture that solitons are not newtonian particles is discussed. It is shown that whether or not newtonian motion is observed will depend critically on the definition of the soliton's center. Nonlinear Scattering of Whistlers by Electrostatic Fluctuations: sharply localized is demonstrated that such distributions could possible be explained by a modulational instability arising from interactions with ion-cyclotron waves. The Forced Toda Lattice: An example of an Almost Integrable System: forced integrable systems are discussed using the forced Toda lattice as an example. It is demonstrated how these systems are almost integrable.

DESCRIPTORS: (U) *WHISTLERS, *ELECTROMAGNETIC SCATTERING, *PLASMAS(PHYSICS), CYCLOTRON WAVES, ELECTROSTATICS, IONS, MOTION, NONLINEAR SYSTEMS, VARIATIONS, EIGENVALUES, SCHRODINGER EQUATION, CROSSED FIELD DEVICES.

IDENTIFIERS: (U) *Solitons, Toda lattices, Solitary waves, Sine Gordon equations, Vlasov poisson equations, PE61102F, WUAFOSR2304A4.

AD-A186 792

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 791 14/2 7/4 20/10 9/5

ARIZONA STATE UNIV TEMPE COLL OF ENGINEERING AND APPLIED SCIENCES

(U) Molecular Beam Epitaxy for Research on Quantum Well Structures.

DESCRIPTIVE NOTE: Final technical rept.,

SEP 87 18P

PERSONAL AUTHORS: Maracas, George N.

CONTRACT NO. AFOSR-86-0222

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-87-1516

UNCLASSIFIED REPORT

ABSTRACT: (U) Proposed was the purchase of a Molecular Beam Epitaxy (MBE) system as the key instrument to establish a coherent, interdisciplinary research program in the area of quantum well structure research. The system will have two growth chambers instead of the proposed single chamber. One is a conventional solid source MBE systm and the other is the novel gas source MBE with organometallic sources. Our growth capability is thus enhanced by the acquisition of a system in which pioneering materials research can be performed. Custom modifications to the growth systems have been incorporated to allow non-standard, in situe MBE analytical studies to be performed. It is believed that our MBE system is at present unique in a US university. These programs will concentrate on basic material growth kinetics in gas source MBE, heterojunction and multi-quantum well (MQW) electronic and optical properties and devices for integrated optoelectronics.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *MOLECULAR BEAMS, *QUANTUM THEORY, *QUNTUM ELECTRONICS, ACQUISITION, SOURCES, GROWTH(GENERAL), INTEGRATED SYSTEMS, ORGANOMETALLIC COMPUNDS, KINETICS, MATERIALS, HETEROJUNCTIONS, INSTRUMENTATION, STRUCTURAL ENGINEERING, STRUCTURES.

AD-A186 791

AD-A186 791 CONTINUED

IDENTIFIERS: (U) Quantum Wells, Integrated Optics.

DTIC REPORT BIBLIOGRAPHY

AD-A186 790 12/1

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Comments on Some Results on Pole-Placement and Reachability.

86 6P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1416

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters, v8 p79-83 1986.

ABSTRACT: (U) We present various comments on a question about systems over rings posed in a recent note by Sharma, proving that a ring R is pole assihnable if and only if, for every reachable system (F,G), G contains a rank-one summed of the state space. We also provide a generalization to deal with dynamic feedback. Keywords: Systems over rings, Feedback, Pole placement.

DESCRIPTORS: (U) *RINGS(MATHEMATICS), DYNAMICS, FEEDBACK, SERIES(MATHEMATICS), REPRINTS.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

AD-A186 790

SEARCH CONTROL NO. EVJ50D

AD-A186 789 12/4 12/3

INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

(U) On the Probabilistic Performance of Algorithms for the Satisfiability Problem.

DESCRIPTIVE NOTE: Rept. for 30 Sep 84-20 Aug 86,

86 6P

PERSONAL AUTHORS: Franco, John

CONTRACT NO. AFOSR-84-0372

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-87-1216

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Information Processing Letters, v23 p103-106 1986.

ABSTRACT: (U) The satisfiability problem (SAT) is the problem of determining whether a given collection I of disjunctions (clauses) of boolean literals can all be satisfied (have value true) by some consistent assignment of truth values to the literals of I (truth assignment). SAT is NP-complete so there is no known efficient algorithm for solving this problem. The Davis-Putnam procedure (DPP)(4) is a well-known, much studied method for solving instances of SAT. The probabilistic analysis of variants of DPP under the assumption of constant-density input distributions such as in (7,8,9) has given the impression that the David-Putnam procedure is intrinsically a very fast method for solving most instances of SAT. This impression is moderated somewhat by the results of this letter which show that the following two trivial algorithms, run concurrently, solve 'more' instances of SAT in polynomial time than all previously studies algorithms.

DESCRIPTORS: (U) *PROBABILITY, *NONLINEAR PROGRAMMING, ALGORITHMS, POLYNOMIALS, EFFICIENCY, VARIATIONS, BOOLEAN ALGEBRA, REPRINTS.

AD-A186 789

AD-A186 789 CONTINUED

IDENTIFIERS: (U) Satisfiability Problems, Davis Putnam Procedure.

AD-A186 786 12/5

CALIFORNIA UNIV SANTA BARBARA ALGEBRA INST

(U) Computer Generated Numerical Ranges and Some Resulting Theorems,

87 38P

PERSONAL AUTHORS: Marcus, Marvin; Pesce, Claire

CONTRACT NO. AFOSR-83-0150

MONITOR: AFOSR TR-87-1014

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear and Multilinear Algebra, v20 p121-157 1987.

ABSTRACT: (U) The numerical range, W(A), of an arbitrary n-square matrix A is the union or the numerical ranges of all 2-square real compressions of A. As a result, a simple graphic program is written that accurately exhibits W(A), and suggests several conjectures are analyzed in the final sections of the paper. Typical theorams describe necessary and sufficient conditions for the numerical range of a nilpotent matrix to be a disk centered at the origin. Keywords: Eigenvalves; Reprints; Computations; Computer program documentation).

DESCRIPTORS: (U) *COMPUTER PROGRAM DOCUMENTATION, *COMPUTER GRAPHICS, COMPUTATIONS, NUMERICAL ANALYSIS, GRAPHICS, REPRINTS, EIGENVALUES.

IDENTIFIERS: (U) Numerical Range.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 784 12/3

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MATHEMATICS

(U) Equivalent Models for Finite-Fuel Stochastic Control,

86 33P

PERSONAL AUTHORS: Karatzas, Ioannis; Shreve, Steven E.

CONTRACT NO. NSF-DMS84-16736

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-87-1260

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastics, v18 p245-276 1986.

ABSTRACT: (U) A stochastic control problem with finite fuel constraint is solved explicity. It is shown to be reducible to simpler stochastic optimization problems, such as optimal stopping and singular control for Brownian motion with unlimited fuel.

DESCRIPTORS: (U) *FUELS, *STOCHASTIC PROCESSES, BROWNIAN MOTION, OPTIMIZATION, STOPPING, CONTROL, MODELS, FUELS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A.

AD-A186 784

AD-A186 778 12/1 2/2

CALIFORNIA UNIV SANTA BARBARA ALGEBRA INST

(U) Convenient Stability Criteria for Difference Approximations of Hyperbolic Initial-Boundary Value Problems. II,

APR 87 20P

PERSONAL AUTHORS: Goldberg, Moshe; Tadmor, Eitan

CONTRACT NO. AFOSR-83-0150

MONITOR: AFOSR
TR-87-1544

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematics of Computation, v48 n178 p503-520 Apr 87.

ABSTRACT: (U) The purpose of this paper is to extend previous results in order to achieve more versatile, convenient stability criteria for a wide class of finite-difference approximations to initial-boundary value problems associated with the hyperbolic system u sub t = Au sub x + bu + f in the quarter plane x > 0, t > 0. With these criteria, stability is easily established for a large number of examples, where many of the cases studied in the recent literature are included and generalized.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, APPROXIMATION(MATHEMATICS), FINITE DIFFERENCE THEORY, BOUNDARY VALUE PROBLEMS, HYPERBOLAS, STABILITY, REPRINTS.

IDENTIFIERS: (U) INITIAL VALUE PROBLEMS, HYPERBOLIC DIFFERETIAL EQUATIONS.

AD-A186 778

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 773 12/1 12/5

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Vision Algorithms and Psychophysics.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 86-31 Mar 87,

OCT 87 6P

PERSONAL AUTHORS: Richards, Whitman

CONTRACT NO. AFOSR-86-0139

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-87-1534

UNCLASSIFIED REPORT

ABSTRACT: (U) Over the past year, we have made significant progress in understanding shape perception based on curvature extrema. Through psychophysical experiments in conjunction with H.R. Wilson (Univ. of Chicago), we now are able to identify which of several computer algorithms for extracting curvature are biologically the most feasible.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *PSYCHOPHYSICS, *ALGORITHMS, TEST METHODS, SHAPE, CURVATURE, EXTRACTION, VISION, TWO DIMENSIONAL, THREE DIMENSIONAL, IMAGE PROCESSING, COMPUTER GRAPHICS, VISUAL PERCEPTION.

IDENTIFIERS: (U) Computer Vision, PE61102F, WUAFOSR2313A5.

AD-A186 772 7/4 20/12 9/3

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Energy Disposal in Ion-Molecule Reactions.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-19 May 87,

SEP 87 5P

PERSONAL AUTHORS: Bowers, Michael T.

CONTRACT NO. AFOSR-86-0286

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-87-1512

UNCLASSIFIED REPORT

ABSTRACT: (U) An Excimer Laser and Dye Laser were purchased. Preliminary experiments were completed in 3 areas: A. Ion beam studies of state selected ions. B. Semiconductor clusters. C. Radiative lifetimes of long lived ionic states. Keywords: Ion Molecule reactions; Photodissociation of Ions; Radiative lifetimes.

DESCRIPTORS: (U) *EXCIMERS, *SEMICONDUCTORS, *CHEMICAL REACTIONS, *PHOTOEXCITATION, DYE LASERS, ION ION INTERACTIONS, MOLECULES, IONS, PHOTODISSOCIATION, CLUSTERING, DISPOSAL, ION BEAMS, ENERGY, IONIZATION, RADIATION, LASER PUMPING, ELECTRONIC STATES, DECAY SCHEMES, ENERGY TRANSFER.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 767 20/4

LEHIGH UNIV BETHLEHEM PA DEPT OF MECHANICAL ENGINEERING AND MECHANICS

(U) Unsteady Behavior of Three-Dimensional Vortices Relevant to Turbulent Boundary Layers.

DESCRIPTIVE NOTE: Annual technical rept. Jul 86-Jul 87,

AUG 87 29P

PERSONAL AUTHORS: Smith, C. R. Walker, J. D.

CONTRACT NO. F49620-85-C-0108

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1536

UNCLASSIFIED REPORT

ABSTRACT: (U) The recent accomplishments are reviewed for a research program employing combined analytical-experiments techniques to study the three dimensional characteristics and behavior of vortex motions associated with the turbulence production process in turbulent boundary layers. Progress is described in the development of a new image processing technique which allows the derivation of quantitative data from flow visualization images. The method is used to search for the role of hairpin vortices in the turbulence production process. In the analytical portion of the study, calculations have been carried out to compute the evolution of a hairpin vortex in a shear flow; the interaction of a pair of hairpins has been examined as well as the viscous response at a wall due to the motion of a hairpin vortex. Comparison of these computer simulations with the experimental studies is very encouraging. Computations for the evolving flow between wall layer streaks during a typical cycle in the wall layer of a turbulent boundary layer have also been carried out; these studies show two possible routes to breakdown of the wall layer flow leading to the production process. Keywords: Turbulent boundary layers; Hairpin vortices; Vortex motion.

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *VORTICES,

AD-A186 767

AD-A186 767 CONTINUED

COMPUTATIONS, COMPUTERIZED SIMULATION, EXPERIMENTAL DATA, FLOW VISUALIZATION, IMAGE PROCESSING, SHEAR PROPERTIES, THREE DIMENSIONAL, TURBULENCE, VISCOSITY, WALLS, UNSTEADY FLOW, LAYERS.

IDENTIFIERS: (U) Hairpin vortices, PE61102F, WUAFOSR2307A2.

AD-A186 758 12/2

GEORGETOWN UNIV WASHINGTON D C DEPT OF MATHEMATICS

(U) Stabilization of Hyperbolic Systems Using Concentrated Sensors and Actuators.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-30 Sep 87,

DEC 86 8P

PERSONAL AUTHORS: Delfour, Michel C.; Lagnese, John; Polis, Michael P.

CONTRACT NO. AFOSR-86-0162

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1555

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-31 n12 p1091-1096 Dec 86.

ABSTRACT: (U) Certain hyperbolic systems of partial differential equations which are known to be uniformly asymptotically stabilizable using point sensors/actuators (S/A) are considered. The issue to be investigated is the effect on stability when point S/A's are replaced by concentrated S/A's, that is. S/A's which average over small regions of the spatial domain. Although it is known that passing from point to concentrated S/A's necessarily destroys uniform stability, a necessary and sufficient condition for strong stability is obtained in terms of the S/A weighting functions. In addition, in the special case of a cantilevered beam controlled by a single sensor/actuator pair concentrated at the free end, another, more robust type of stability is shown to hold, even when strong stability does not. The latter result shows that the system energy is bounded by a part which goes uniformly to zero at infinity and a residual which can be explicitly estimated in terms of the support of the weight functions and the initial energy. Furthermore, the residual energy converges to zero as the support reduces to the point at the point at the free end of the beam.

AD-A186 758 CONTINUED

DESCRIPTORS: (U) *ACTUATORS, *DETECTORS, *PARTIAL DIFFERENTIAL EQUATIONS, *STABILIZATION SYSTEMS, *WEIGHTING FUNCTIONS, CANTILEVER BEAMS, DIFFERENTIAL EQUATIONS, ENERGY, RESIDUALS, SPATIAL DISTRIBUTION, STABILITY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 756 20/9

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Atomic and Ionic Fluorescence Dip Spectroscopy as a Tool for Flame and Plasma Diagnostics,

87 13P

PERSONAL AUTHORS: Omenetto, N.; Turk, G. C.; Rutledge, M.; Winefordner, J. D.

CONTRACT NO. AFOSR-86-0015

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1238

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectrochimica Acta, v42B n6 p807-817 1987.

ABSTRACT: (U) When two pulsed dye lasers are tuned in spatial and temporal coincidence to two connected atomic transitions in a flame or plasma, the resonance fluorescence monitored from the first excited level decreases due to the depletion of the population of that level induced by the second laser excitation step. The monitoring of such a decrease (fluorescence dip) can be shown from simple theoretical considerations to be useful for diagnostic studies and for the evaluation of some fundamental parameters of the atomic transition involved in the second excitation step. Both steady state and transient behaviour are discussed. The information content of the fluorescence dip is similar to that of the saturated fluorescence signal. However, several distinct advantages are offered by the new technique especially when the level reached by the second excitation step is close to the ionization limit of the atom. Keywords: Fluorescence, Laser excitation, Flame, Fluorescence dip, Plasma, Diagnostics.

DESCRIPTORS: (U) *ATOMIC SPECTROSCOPY, *FLUORESCENCE, *PLASMA DIAGNOSTICS, *FLAMES, ATOMS, BEHAVIOR, DEPLETION, DYE LASERS, ELECTRON TRANSITIONS, EXCITATION, IONIZATION, LASERS, LIMITATIONS, POPULATION, PULSED LASERS,

AD-A186 756

AD-A186 756 CONTINUED

SATURATION, SIGNALS, STEADY STATE, TRANSIENTS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 738 7/4 14/2 20/5

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Product Correlations in Photofragment Dynamics,

86 13P

PERSONAL AUTHORS: Hall, Gregory E.; Sivakumar, Natarajan; Ogorzalek, Rachel; Chawla, Gunjit; Haerri, Hans-Peter

CONTRACT NO. F49620-83-K-0012

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1382

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Faraday Discussions of the Chemical Society, v82 p13-24 1986.

ABSTRACT: (U) Correlations between either scalar or vector quantities measured in the study of photodissociation dynamics can serve to provide a very detailed picture of the dissociative event. This article discusses the use of Doppler profile and time of flight spectroscopy to learn about the correlation between the separate internal energies of two recoiling fragments, to study the way in which the internal energy distribution of a fragment varies with its recoil direction and to determine the angle between a photofragment's recoil velocity direction and its rotation vector. Two new techniques are introduced. High-voltage switching of the potential applied to a time-of-flight mass spectrometer is used to map the velocity distribution of photofragments onto their arrival time distribution. Probing of photofragments by polarized light with sub-Doppler resolution is used to determine the degree of angular correlation between their rotation vector and their recoil velocity vector. (Reprints)

DESCRIPTORS: (U) *PHOTODISSOCIATION, *PHOTOFRAGMENT SPECTROSCOPY, *MASS SPECTROMETERS, *VECTOR ANALYSIS, ARRIVAL, DISTRIBUTION, TIME, HIGH VOLTAGE, SWITCHING, ENERGY, INTERNAL, CORRELATION, RECOIL, VELOCITY, ANGLES, REPRINTS, FLIGHT, SPECTROSCOPY, TIME.

AD-A186 738

AD-A186 738 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 737 7/2

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Group IIA Metastable Collision Complexes: Spectroscopy and Behavior in Intense Radiation Fields.

DESCRIPTIVE NOTE: Final rept.,

SEP 87 67P

PERSONAL AUTHORS: Cooper, J.; Coutts, J.

CONTRACT NO. AFOSR-84-0027

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1374

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes work addressing the problems of collisional induced oscillator strength and energy transfer from metastable states in Group IIA alkaline earth metal atoms. The quenching of CA 3PJ states when perturbed by rare was atom collisions is investigated and such quenching is found to be negligable. The CA 1D2 state, however shows considerable collisional induced effects. Calculations have been performed which show that collision cross-sections for transfer of electronic excitation may be switched from the low values typically associated with off-resonant processes to the high values associated with resonant processes by using a strong laser to bring dressed states in one atom in and out of resonance with bare states in another atom. Keywords: Slow atomic collisions; Chemical lasers.

DESCRIPTORS: (U) *ALKALINE EARTH METALS, *METALS, *COLLISIONS, *METASTABLE STATE, *ENERGY TRANSFER, CHEMICAL LASERS, OSCILLATORS, STRENGTH(GENERAL), INTENSITY, THERMAL RADIATION, ATOMS, RESONANCE, LASERS, QUENCHING, PARTICLE COLLISIONS, SPECTROSCOPY, ADDRESSING, ELECTRONS, EXCITATION, TRANSFER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A186 737

AD-A186 736 20/4

MCDONNELL DOUGLAS RESEARCH LABS ST LOUIS MO

(U) Active Control of Jet Flowfields.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 83-31 Dec 85,

JUN 87 39P

PERSONAL AUTHORS: Kibens, Valdis; Wlezien, Richard W.

REPORT NO. MDC-Q1296

CONTRACT NO. F49620-83-C-0048

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1476

UNCLASSIFIED REPORT

ABSTRACT: (U) Passive and active control of jet shear layer development were investigated as mechanisms for modifying the global characteristics of jet flowfields. Slanted and stepped indeterminate origin (I.O.) nozzles were used as passive, geometry-based control devices which modified the flow origins. Active control techniques were also investigated, in which periodic acoustic excitation signals were injected into the I.O. nozzle shear layers. Flow visualization techniques based on a pulsed copper-vapor laser were used in a phase-conditioned image acquisition mode to assemble optically averaged sets of images acquired at known times throughout the repetition cycle of the basic flow oscillation period. Hot wire data were used to verify the effect of the control techniques on the mean and fluctuating flow properties. The flow visualization images were digitally enhanced and processed to show locations of prominent vorticity concentrations. Three-dimensional vortex interaction patterns were assembled in a format suitable for movie mode on a graphic display workstation, showing the evolution of three-dimensional vortex systems in time. Keywords: Fluid mechanics; Shear layers; Jet flows; Passive control; Active control; Image processing; Control of turbulence; Asymmetric nozzles;

AD-A186 73[illegible]

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 736 CONTINUED

Slanted nozzles.

DESCRIPTORS: (U) *NOZZLES, *CONTROL SYSTEMS, *TURBULENCE, *JET FLOW, *VORTICES, CONTROL, ASYMMETRY, FLOW VISUALIZATION, IMAGES, FLUID MECHANICS, GRAPHICS, STATIONS, WORK, IMAGE PROCESSING, FLOW FIELDS, GLOBAL, HOT WIRE, UNSTEADY FLOW, MODIFICATION, OSCILLATION, DISPLAY SYSTEMS, LASER VELOCIMETERS, MOTION PICTURES, PASSIVE SYSTEMS, COPPER, PULSED LASERS, METAL VAPORS, INTERACTIONS, PATTERNS, THREE DIMENSIONAL FLOW, LAYERS, SHEAR PROPERTIES, ACOUSTIC SIGNALS, ACOUSTIC WAVES, EXCITATION, CYCLES, REPETITION RATE.

IDENTIFIERS: (U) Active control, Asymmetric nozzles, Slanted nozzles, Indeterminate origin nozzles, Stepped nozzles, Laser doppler velocimetry, PE61102F, WUAFOSR2307A2.

AD-A186 735 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Measuring the Dependence between Two Point Processes through Confidence Intervals for the Second Order Distribution.

DESCRIPTIVE NOTE: Technical rept.,

SEP 87 21P

PERSONAL AUTHORS: Doss, Hani

REPORT NO. FSU-STATISTICS-M767

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1531

UNCLASSIFIED REPORT

ABSTRACT: (U) To assess the dependence structure in a stationary bivariate point process the second-order distribution can be very useful. We prove that the natural estimates of this distribution, based on a realization A1 < A2 < ... < Asub A, B1 < B2 < ... < B sub b are asymptotically normal, and we present a method for constructing approximate confidence intervals for this distribution. Keywords: Bivariate point process; Ripley's K-function; cross-intensity function; Stationary point process; stationary sequence.

DESCRIPTORS: (U) *CONFIDENCE LIMITS, *BIVARIATE ANALYSIS, INTERVALS, STATIONARY, ESTIMATES, PROBABILITY DISTRIBUTION FUNCTIONS, FUNCTIONS, SEQUENCES(MATHEMATICS), POINT THEOREM.

IDENTIFIERS: (U) Point Process, Ripley k functions, Cross intensity functions, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 730 12/2

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF MATHEMATICS

(U) A General Form for Solvable Linear Time Varying Singular Systems of Differential Equations,

JUL 87 15P

PERSONAL AUTHORS: Campbell, Stephen L.

CONTRACT NO. AFOSR-87-0051, $AFOSR-84-0240

MONITOR: AFOSR TR-87-1554

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Mathematical Analysis, v18 n4 p1101-1115 Jul 87.

ABSTRACT: (U) A canonical form is derived for all linear solvable systems E(t)x'(t)+F(t)=f(t) with sufficiently smooth coefficients E, F. Using this form it is shown that for all smooth enough solvable systems a class of recently defined numerical imbedding methods and an algorithm to compute the manifold of consistent initial conditions always work. In addition, necessary and sufficient conditions are given on E(t), F(t) to insure solvability in the case when E(t), F(t) are infinitely differentiable. Keywords: linear time varying system; implicit; descriptor; singular; solvability; numerical imbedding; consistent initial conditions; approximation.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, ALGORITHMS, LINEAR SYSTEMS, COEFFICIENTS, SOLUTIONS(GENERAL), CONVERGENCE, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Imbedding(Mathematics).

AD-A186 730

AD-A186 727 12/3 12/4

WAYNE STATE UNIV DETROIT MI

(U) Optimal Correction Problem of a Multidimensional Stochastic System,

SEP 87 29P

PERSONAL AUTHORS: Menaldi, J. L.; Taksar, M. I.

CONTRACT NO. AFOSR-87-0278, $NSF-DMS86-01998

MONITOR: AFOSR TR-87-1479

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider a stochastic dynamic system which is governed by a multidimensional diffusion process with constant drift and diffusion coefficients. The correction corresponds to an additive input which is under control. There is no limit on the rate of input into the system. The objective is to minimize the expected cumulative cost associated with the position of the system and the amount of control exerted. It is proved that Hamilton-Jacobi-Bellman's equation of the problem has a solution, which corresponds to the optimal cost of the problem. An existence of optimal policy is proved.

DESCRIPTORS: (U) *OPTIMIZATION, *STOCHASTIC PROCESSES, *CONTROL SYSTEMS, *DYNAMIC PROGRAMMING, ADDITIVES, INPUT, COSTS, DIFFUSION, CORRECTIONS, POLICIES, RATES, DRIFT, DIFFUSION COEFFICIENT, POSITION(LOCATION), DYNAMICS, BROWNIAN MOTION.

IDENTIFIERS: (U) Hamilton Jacobi Bellman Equation.

AD-A186 727

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 725 12/9

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Outlier Resistant Predictive Source Encoding for a Gaussian Stationary Nominal Source.

DESCRIPTIVE NOTE: Technical rept. for period ending 1 Jul 87.

SEP 87 43P

PERSONAL AUTHORS: Kazakos, P.

REPORT NO. UVA/525682/EE88/102

CONTRACT NO. AFOSR-87-0224

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1530

UNCLASSIFIED REPORT

ABSTRACT: (U) A sequence of qualitatively robust predictive source encoders, for a Gaussian stationary source with outlier contaminated observation data, is proposed and analyzed. Performance measures include mean difference-sequence distortion and output entropy at the nominal Gaussian source, as well as breakdown point and influence function. The proposed sequence of predictive encoders attains strictly positive breakdown point and uniformly bounded influence function, at the expense of increased mean difference-squared distortion and differential entropy, at the Gaussian nominal source.

DESCRIPTORS: (U) *ENTROPY, *CODING, *STATISTICAL ANALYSIS, CONTAMINATION, OBSERVATION, COSTS, OUTPUT, PROBABILITY DENSITY FUNCTIONS.

IDENTIFIERS: (U) Gutliers(Statistics), Gaussian distribution functions, Robust procedures, Prohorov distance, PE61102F, WUAFOSR2304A5.

AD-A186 725

AD-A186 722 12/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Inference for the Exponential Life Distribution,

85 23P

PERSONAL AUTHORS: Barlow, R. E.; Proschan, Frank

REPORT NO. FSU-STATISTICS-M-568-R, P-463

CONTRACT NO. AFOSR-77-3179

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1013

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE. Pub. in Theory of Reliability, p143-164 1985.

ABSTRACT: (U) Our objective is to develop methodology for analyzing life test data. Initially, there is only data-no mathematical models. Through an exploratory data analysis or an analysis based on the physical processes generating the data, an exponential life distribution model may be judged as appropriate for the analysis of the data. Specifically: where lambda is the unknown constant failure rate. The vertical bar in F(x/lambda) indicates that we are conditioning on the parameter lambda; i.e., for specified lambda the distribution is exponential with failure rate lambda. The corresponding density is F(x/lambda) = lambda exp -LAMBDA X, x > or =, lambda > 0.

DESCRIPTORS: (U) *LIFE TESTS, *MATHEMATICAL MODELS, FAILURE, RATES, DATA PROCESSING, DISTRIBUTION FUNCTIONS, EXPONENTIAL FUNCTIONS, LIFE EXPECTANCY(SERVICE LIFE), REPRINTS, VERTICAL ORIENTATION, RELIABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 722

DTIC REPORT BIBLIOGRAPHY

AD-A186 720 20/3 12/2

BRANDEIS UNIV WALTHAM MA

(U) Sliding Charge Density Waves and Related Problems.

DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Mar 87,

MAR 87 40P

PERSONAL AUTHORS: Sneddon, L.

CONTRACT NO. AFOSR-84-0014

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-87-1373

UNCLASSIFIED REPORT

ABSTRACT: (U) From the publications (in many cases from the Figures) it is seen that incommensurate chaines give a surprisingly good account of the following dozen measurements: both components of complex ac conductivities as functions of field and frequency, in both metallic and semiconducting CDW materials; dc characteristics; scaling of ac and dc conductivities; elastic properties - Young's Modules and Q-factor as functions of voltage; bulk oscillations; and both amplitude and phase of both the second and third order mixing properties. In addition, incommensurate chains have been seen to exhibit complete mode locking over the entire range of dc fields and external frequencies. Keywords: Sliding density waves; Sliding potential.

DESCRIPTORS: (U) *CONDUCTIVITY, *CHAINS, *DIRECT CURRENT, *MIXING, *SLIDING, *OSCILLATION, ALTERNATING CURRENT, EXTERNAL, FREQUENCY, DENSITY, WAVES, ELASTIC PROPERTIES, CHARGE DENSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8

AD-A186 720

SEARCH CONTROL NO. EVJ50D

AD-A186 719 20/4

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) New Techniques in Computational Aerodynamics.

DESCRIPTIVE NOTE: Final rept. 1 Jun 83-28 Feb 87,

AUG 87 95P

PERSONAL AUTHORS: Sirovich, Lawrence

CONTRACT NO. AFOSR-83-0336

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-87-1419

UNCLASSIFIED REPORT

ABSTRACT: (U) A wide range of problems in gas dynamics have been considered. Advances in subsonic, transonic, and supersonic gasdynamics have been made. The emphasis has been made on computational procedures both numerical and algebraic. This work has a strong basis in analytical methods, and goal has been to produce computational efficient codes which made optimal use of analytically known results. Keywords: Airfoils; Compressible flow; Pressure distribution; Supersonic; Inviscid flow; Three dimensional flow; Supersonic axisymmetric flow.

DESCRIPTORS: (U) *SUPERSONIC CHARACTERISTICS, *SUBSONIC CHARACTERISTICS, *TRANSONIC CHARACTERISTICS, *NUMERICAL METHODS AND PROCEDURES, AIRFOILS, AERODYNAMICS, COMPUTATIONS, COMPUTATIONS, OPTIMIZATION, AXIALLY SYMMETRIC FLOW, SUPERSONIC FLOW, THREE DIMENSIONAL FLOW, COMPRESSIBLE FLOW, CODING, EFFICIENCY, GAS DYNAMICS, PRESSURE DISTRIBUTION, RANGE(EXTREMES), INVISCID FLOW.

IDENTIFIERS: (U) Computational fluid dynamics, Jacobi matrices, PE61102F, WUAFOSR2307A1.

AD-A186 719

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 713 12/6 12/5

PURDUE RESEARCH FOUNDATION LAFAYETTE IN

(U) Algorithm Design for Scientific Computation for Highly Parallel Multiprocessor Systems.

DESCRIPTIVE NOTE: Final rept.,

87 3P

PERSONAL AUTHORS: Gannon, Dennis

CONTRACT NO. AFOSR-85-0123

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1454

UNCLASSIFIED REPORT

ABSTRACT: (U) As part of the AFOSR Fast Algorithms Initiative, the project focused on the design of parallel algorithms and the related software design problems associated with multiprocessor systems. The research work was divided into two phases. The primary emphasis of the first phase was to study new algorithm ideas for solving the large numerical linear algebra problems associated with two and three dimensional elliptic P.D.E. problems. The work in the second phase of the research was directed toward understanding the software mechanisms needed to map these algorithms to existing parallel computers. In the following paragraphs we detail our work in both areas.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *PARALLEL PROCESSING, *ALGORITHMS, MULTIPROCESSORS, COMPUTERS, PARALLEL ORIENTATION, COMPUTATIONS.

AD-A186 713

AD-A186 712 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Variance Function Estimation. Revision.

DESCRIPTIVE NOTE: Journal article Aug 86-Aug 87,

MAR 87 52P

PERSONAL AUTHORS: Davidian, Marie; Carroll, R. J.

REPORT NO. MIMEO SER-1700-REV

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1102

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Jul 86, AD-A174 961.

ABSTRACT: (U) Heteroscedastic regression models are used in fields including economics, engineering, and the biological and physical sciences. This paper studies variance function estimation in a unified way, focusing on common methods proposed in the statistical and other literature, in order to make both general observations and compare different estimation schemes. There are significant differences in both efficiency and robustness for many common methods. A general theory is developed for variance function estimation, focusing on estimation of the structural parameters and including most methods in common use in our development. The general qualitative conclusions are these. First, most variance function estimation procedures can be looked upon as regressions with responses being transformations of absolute residuals from a preliminary fit or sample standard deviations from replicates at a design point. The former is typically more efficient, but not uniformly so. Secondly, for variance function estimates based on transformations of absolute residuals, we show that efficiency is a monotone function of the efficiency of the fit from which the residuals are formed at least for

AD-A186 712

AD-A186 712 CONTINUED

symmetric errors. Our conclusion is that one should iterate so that residuals are based on generalized least squares. Finally, robustness issues are of even more importance here than in estimation of a regression function for the mean. The loss of efficiency of the standard method away from the normal distribution is much more rapid than in the regression problem.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, *ANALYSIS OF VARIANCE, RESIDUALS, MONOTONE FUNCTIONS, ESTIMATES, LEAST SQUARE METHOD, NORMAL DISTRIBUTION, MATHEMATICAL MODELS, COVARIANCE, ASYMPTOTIC SERIES, TRANSFORMATIONS(MATHEMATICS), PARAMETERS, RESIDUALS, VARIATIONS, SYMMETRY.

IDENTIFIERS: (U) Heteroscedasticity, Robust procedures, PE61102F, WUAFOSR2304A5.

AD-A186 712

AD-A186 711 20/9 14/2

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Error Modeling and Confidence Interval Estimation for Inductively Coupled Plasma Calibration Curves.

DESCRIPTIVE NOTE: Journal article Aug 86-Aug 87,

FEB 87 29P

PERSONAL AUTHORS: Watters, Robert L., Jr.; Carroll, Raymond J.; Spiegelman, Clifford H.

REPORT NO. MIMEO SER-1715

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1098

UNCLASSIFIED REPORT

ABSTRACT: (U) A simple linear calibration function can be used over a wide concentration range for the Inductively Coupled Plasma (ICP) spectrometer due to its linear responses. The random errors over wide concentration ranges are not constant, and constant variance regression should not be used to estimate the calibration function. Weighted regression techniques are appropriate if the proper weights can be obtained. Use of the calibration curve to estimate. The concentration of one or more unknown samples is straightforward, but confidence interval estimation for multiple use of the calibration curve is les obvious. A method is described for modeling the error along the ICP calibration curve using the estimated parameters from the fitted model to calculate weights for the calibration curve fit. Multiple and single-use confidence interval estimates are obtained and results along the calibration curve are compared.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *SPECTROMETERS, CALIBRATION, CURVED PROFILES, REGRESSION ANALYSIS, VARIATIONS, COUPLING(INTERACTION), LINEAR SYSTEMS, ESTIMATES, ERRORS, MODELS, WEIGHTING FUNCTIONS, REGRESSION ANALYSIS.

AD-A186 711

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 711 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 709 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) A Note on Computing Robust Regression Estimates via *Iteratively Reweighted Least Squares*.

DESCRIPTIVE NOTE: Journal article Aug 86-Aug 87,

FEB 87 14P

PERSONAL AUTHORS: Carroll, Raymond J.; Ruppert, David; Street, James O.

REPORT NO. MIMEO SER-1714

CONTRACT NO. F49620-85-C-0144, $NSF-MCS81-00748

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1097

UNCLASSIFIED REPORT

ABSTRACT: (U) Statistics provides a method for computing robust regression estimates using iterative reweighted least squares and the nonlinear regression procedure NLIN. While the estimates are asymptotically correct, the resulting standard errors are not. Computation of the estimates are discussed.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, COMPUTATIONS, ESTIMATES, NONLINEAR ANALYSIS, ERRORS, LEAST SQUARES METHOD, ESTIMATES, WEIGHTING FUNCTIONS, ITERATIONS.

IDENTIFIERS: (U) Robust procedures, NLIN algorithm, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 707 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Monte Carlo Modeling of Ionospheric Oxygen Acceleration by Cyclotron Resonance with Broad-Band Electromagnetic Turbulence,

JUL 87

PERSONAL AUTHORS: Retterer, John M.; Chang, Tom; Crew, G. B.; Jasperse, J. R.; Winningham, J. D.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR TR-87-1409

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v59 n1 p148-151, 6 Jul 87.

ABSTRACT: (U) Cyclotron resonance with observed electric field fluctuations is responsible for production of the oxygen ion conics that are observed by the Dynamics Explorer 1 satellite in the central plasma sheet region of the Earth's magnetosphere. The ion velocity distribution is described by a quasi-linear diffusion equation which is solved by the Monte Carlo technique. The acceleration produced by the observed wave spectrum agrees well with the ion observations, in both form and magnitude. This represents the first successful comparison of an observed conic with any theoretical model. Keywords: Ionospheric modeling; Ion acceleration; Broadband electromagnetic turbulence.

DESCRIPTORS: (U) *CYCLOTRON RESONANCE, *IONOSPHERIC DISTURBANCES, ACCELERATION, BROADBAND, DISTRIBUTION, ELECTRIC FIELDS, ELECTROMAGNETISM, ION ACCELERATORS, IONOSPHERIC MODELS, IONS, MAGNETOSPHERE, MONTE CARLO METHOD, OXYGEN, PLASMAS(PHYSICS), SPECTRA, THEORY, TURBULENCE, VARIATIONS, VELOCITY, WAVES, ELECTROMAGNETIC ENVIRONMENTS.

IDENTIFIERS: (U) Conics(Atmospheric), Plasma sheets,

AD-A186 707

AD-A186 707 CONTINUED

Dynamics Explorer 1 satellite, PE61102F, WUAFOSR3484A2.

AD-A186 706 12/8

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J

(U) Regulation of Nonlinear and Generalized Linear Systems.

DESCRIPTIVE NOTE: Interim technical rept. 15 Jul 86-14 Jul 87,

JUL 87 9P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1394

UNCLASSIFIED REPORT

ABSTRACT: (U) This project concentrated on issues of nonlinear control design, with an emphasis on digital systems and symbolic methods. One area of effort was that of studying the effect of the use of sampling on the controllability and observability of nonlinear continuous systems as well as on recently developed linearization techniques. This is closely related to work on discrete-time controllability, also in progress under the grant. Another area dealt with a new method for automatic gain scheduling, for which a computerized design is now available. Experimental results are also described. Keywords: Sampling discrete time control systems.

DESCRIPTORS: (U) *COMPUTER APPLICATIONS, *CONTROL THEORY, AUTOMATIC, CONTROL, DIGITAL SYSTEMS, DISCRETE DISTRIBUTION, GAIN, LINEAR SYSTEMS, LINEARITY, NONLINEAR SYSTEMS, SAMPLING, TIME, SYMBOLIC PROGRAMMING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A186 706

AD-A186 704 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Size, Shape, and Site Selectivities in the Photochemical Reactions of Molecules Adsorbed on Pentasil Zeolites Effects of Coadsorbed Water,

87

PERSONAL AUTHORS: Turro, Nicholas J.; Cheng, Chen-Chih; Abrams, Lloyd; Corbin, David R.

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1408

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Americal Chemical Society, v109 n8 p2449-2456 1987.

ABSTRACT: (U) The photochemistry of methylbenzyl benzyl ketones (ACOB) in the presence of pentasil zeolites follows strikingly different pathways due to the location of the absorbed ketone. The product distribution, in terms of the cage effect (efficiency of geminate radical combination), demonstrates the effects of sorption and diffusion on the radical species produced by photolysis. p-ACOB is readily adsorbed within the pentasil framework and produces p-AB as the primary product. In contrast, the photolysis product distributions of o-ACOB can be dramatically varied depending upon the extent of its adsorption into the framework. By addition of a nonreactive titrant, such as water, after the ketone adsorption, the photolysis product distributions can be systematically varied depending upon the aluminum content of the framework. The observed results are completely described by considerations of (a) the size and shape sorption of the pentasil zeolites, (b) the sorption of water by the hydrophilic sites of the pentasil zeolites (which depend upon the framework aluminum content), and (c) the hydrophobic characteristics of pentasil channels which do not contain framework aluminum. Keywords: Zeolites; Pentasil; Molecular sieves; Cage effects;

AD-A186 704

AD-A186 704 CONTINUED

Ketones; Photolysis; Diffusion; Pores; Adsorption.

DESCRIPTORS: (U) *ADSORPTION, *KETONES, *PHOTOLYSIS, *BENZYL RADICALS, ALUMINUM, DISTRIBUTION, HYDROPHOBIC PROPERTIES, MOLECULAR SIEVES, MOLECULES, PHOTOCHEMICAL REACTIONS, SORPTION, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A186 690 17/9

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) Drift Motions of Very High Latitude F Region Irregularities: Azimuthal Doppler Analysis,

OCT 85 13P

PERSONAL AUTHORS: Hanuise, C.; Greenwald, R. A.; Baker, K. B.

CONTRACT NO. N00024-85-C-5301, $AFOSR-ISSA-86-0028

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-87-1459

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v90 nA10 p9719-9725 Oct 85. Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Since October 1983, a new HF radar facility has been operated from Goose Bay, Labrador, for the purpose of studying high-latitude ionospheric irregularities. This paper, presents autocorrelation functions of the backscattered signals from these irregularities and shows how these are processed to yield information on the drift velocities of the irregularities. Since the radar is typically operated in an azimuth scan mode, the Doppler data derived from the autocorrelation functions may be used to study the two-dimensional structure of the irregularity drift. A procedure is presented for this analysis, and it is shown that the results are reasonably accurate during periods in which the irregularity drift is approximately uniform. However, if the flow is nonuniform, as it is in the vicinity of the cusp and in the midnight local time sector, then the procedure leads to erroneous results. The implication are considered that these results have on azimuth scan measurements of plasma drift with incoherent scatter radars, and possible ways are presented in which measurements might be made under nonuniform flow conditions.

AD-A186 704

AD-A186 690

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 690 CONTINUED

DESCRIPTORS: (U) *BACKSCATTERING, *DOPPLER SYSTEMS, *INCOHERENT SCATTERING, *PLASMAS(PHYSICS), *RADAR, AUTOCORRELATION, AZIMUTH, DRIFT, FUNCTIONS(MATHEMATICS), MOTION, NONUNIFORM FLOW, REPRINTS, SCATTERING, SIGNALS, TWO DIMENSIONAL, VELOCITY.

AD-A186 689 1/1

ANALYTICAL METHODS INC REDMOND WA

(U) Predicting Dynamic Separation Characteristics of General Configurations.

DESCRIPTIVE NOTE: Final rept. Apr 84-Jul 87,

JUL 87 48P

PERSONAL AUTHORS: Maskew, B.; Dvorak, F. A.

REPORT NO. AMI-8706

CONTRACT NO. F49620-82-C-0033

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1418

UNCLASSIFIED REPORT

ABSTRACT: (U) A procedure has been developed for treating the dynamic interaction between a separated wake and a surface undergoing an unsteady motion. The basis of the method is an unsteady (time-stepping) panel method coupled with unsteady integral boundary layer codes. Pilot codes have been developed for both two and three dimensional conditions. Results presented here are mainly from the two-dimensional code in which the various routines for controlling the dynamic wake model have been developed. Some viscous/inviscid three-dimensional results are shown. The long term objective is to treat complete aircraft configurations through high angle-of-attack maneuvers. Keywords: Unsteady; Time stepping calculations; Dynamic separated wake model; Coupled viscous inviscid calculations.

DESCRIPTORS: (U) *FLOW SEPARATION, *WAKE, AIRCRAFT, DYNAMICS, INTERACTIONS, ANGLE OF ATTACK, HIGH ANGLES, FLIGHT MANEUVERS, CODING, THREE DIMENSIONAL, COUPLING(INTERACTION), INVISCID FLOW, VISCOSITY, SEPARATION, MATHEMATICAL MODELS, TWO DIMENSIONAL, COMPUTATIONS, MATHEMATICAL PREDICTION, POTENTIAL FLOW, UNSTEADY FLOW, BOUNDARY LAYER FLOW.

AD-A186 690

AD-A186 689

AD-A186 689 CONTINUED

IDENTIFIERS: (U) Time stepping calculations, Panel methods, PE61102F, WUAFOSR2307A2.

AD-A186 688 6/5

CITY OF HOPE BECKMAN RESEARCH INST DUARTE CA DIV OF NEUROSCIENCES

(U) Differential Conditioning of Associative Synaptic Enhancement in Hippocampal Brain Slices,

APR 86 5P

PERSONAL AUTHORS: Kelso, Stephen R.; Brown, Thomas H.

CONTRACT NO. F49620-86-C-0099

MONITOR: AFOSR TR-87-1377

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v232 p85-87, 4 Apr 86.

ABSTRACT: (U) An electrophysiological stimulation paradigm similar to one that produces Pavlovian conditioning was applied to synaptic inputs to pyramidal neurons of hippocampal brain slices. Persistent synaptic enhancement was induced in one of two weak synaptic inputs by pairing high-frequency electrical stimulation of the weak input with stimulation of a third, stronger input to the same region. Forward (temporally overlapping) but not backward (temporally separate) pairings caused this enhancement. Thus hippocampal synapses in vitro can undergo the conditional and selective type of associative modification that could provide the substrate for some of the mnemonic functions in which the hippocampus is thought to participate. (Reprints)

DESCRIPTORS: (U) *ELECTROPHYSIOLOGY, *HIPPOCAMPUS, ASSOCIATIVE PROCESSING, MODIFICATION, STIMULATION(GENERAL), BRAIN, REPRINTS, SUBSTRATES, INPUT, LOW STRENGTH, ASSOCIATIVE PROCESSING, OPTIMIZATION, SYNAPSE, ELECTRIC CURRENT, HIGH FREQUENCY, STIMULATION(GENERAL), IN VITRO ANALYSIS, SYNAPSIS, NERVE CELLS, PYRAMIDS(GEOMETRY), STIMULATION(GENERAL), STIMULATION(PHYSIOLOGY), NERVE TRANSMISSION, CONDITIONING(LEARNING).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 682 12/2 12/9

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Nearly Optimal Singular Controls for Wideband Noise Driven Systems.

DESCRIPTIVE NOTE: Annual rept. Sep 85-Oct 86,

AUG 86 50P

PERSONAL AUTHORS: Kushner, Harold J.; Ramachandran, R. M.

REPORT NO. LCDS-86-43

CONTRACT NO. N00014-83-K-0542, $AFOSR-85-0315

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1395

UNCLASSIFIED REPORT

ABSTRACT: (U) Singular control problems with diffusion or Weiner process systems have been occuring with increasing frequency as models of a wide variety of applications; e.g., storage, inventory, finite fuel, consumption and investment, limits of impulsive control problems, etc. Here, the increment of the control force is not of the usual form u(t)dt, but is the differential of a non-decreasing and suitably adapted process. The models used (Wiener or diffusion processes) are only approximations in some sense to some 'physical' process - perhaps a 'wideband' noise driven system or a suitably scaled discrete parameter process. The optimal controls for these 'physical' processes are usually nearly impossible to obtain. Thus, it is of considerable interest to know whether the optimal (or delta-optimal control for the diffusion model is 'nearly' optimum when applied to the physical problem, when compared to the optimal or delta optimal control for the latter problem. This is true, under broad conditions. The discounted and average cost per unit time problems are treated. The main methods are those of weak convergence theory.

DESCRIPTORS: (U) *NOISE, *CONTROL, *DIFFUSION,

AD-A186 682

AD-A186 682 CONTINUED

*OPTIMIZATION, *BROADBAND, PULSES, APPROXIMATION(MATHEMATICS), STORAGE, THEORY, COSTS, MODELS, FUELS, INVENTORY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A186 682

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 669 25/5 20/14

IOWA STATE UNIV AMES

(U) Transient Electromagnetic Scattering from Heterogeneous Lossy Spheres.

DESCRIPTIVE NOTE: Final rept. 1 Jul-30 Sep 86,

JAN 87

PERSONAL AUTHORS: Corones, Jim

CONTRACT NO. AFOSR-86-0259

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-87-1406

UNCLASSIFIED REPORT

ABSTRACT: (U) Eleven papers were published documentary work performed under this grant, and 14 lectures were presented. Several mathematical results were obtained concerning the performance of protocols for packet switching, local area networks, and satellite communications. In particular, results concerning the stability of the exponential backoff protocol were obtained.

DESCRIPTORS: (U) *COMMUNICATIONS NETWORKS, *ELECTROMAGNETIC SCATTERING, *SATELLITE COMMUNICATIONS, *SWITCHING, ELECTROMAGNETIC RADIATION, HETEROGENEITY, LOSSES, SPHERES, TRANSIENT RADIATION EFFECTS.

IDENTIFIERS: (U) WUAFOSR2304A9, PE61102F.

AD-A186 669

AD-A186 668 7/3

VICTORIA UNIV OF MANCHESTER (ENGLAND) DEPT OF CHEMISTRY

(U) Chemiluminescent Reactions of Fluorine Atoms with Organic Iodides in the Gas Phase. Part 2. Aliphatic and Aromatic Iodides.

87 9P

PERSONAL AUTHORS: Braynis, Helen S.; Raybone, David; Whitehead, J. C.

CONTRACT NO. AFOSR-85-0039

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1403

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Faraday Transactions 2, v83 p639-646 1987.

ABSTRACT: (U) Visible chemiluminescence in the spectral range 200-900nm has been measured for the reactions of F atoms with allyl iodide, monoiodobenzene, hexa-iodobenzene and ortho-, meta- and para-iodotoluene studied at reduced pressures (ca. 0.6 mbar). Emission was observed from electronically excited IF* (B), HCF(A), CH*(A) and C(d) and from vibrationally excited HF. Vibrational populations and rotational temperatures were obtained for the diatomic emitters. There is a strong interdependence of the relative intensity of HCF emission and the intensities of CH and CH, suggesting that their production may involve competing reactions of the same species. The similarity in the types of emitters and their states of formation leads to the conclusion that the same reactions, probably involving very simple species, take place in all cases. Keywords: Chemiluminescence, Iodine Monofluoride, Fluorine atoms, Organic iodides.

DESCRIPTORS: (U) *ALIPHATIC COMPOUNDS, *AROMATIC COMPOUNDS, *IODIDES, *VAPOR PHASES, CHEMILUMINESCENCE, DIATOMIC MOLECULES, EMITTERS, INTENSITY, POPULATION, VIBRATION, ATOMS, CHEMICAL REACTIONS, FLUORINE, IODINE,

AD-A186 668

AD-A186 668 CONTINUED

PRODUCTION, ROTATION, TEMPERATURE, VISIBLE SPECTRA, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A186 631 12/1

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF AEROPHYSICS AND AEROSPACE EN GINEERING

(U) Generation of Surface Grids through Elliptic Partial Differential Equations for Aircraft and Missile Configurations.

DESCRIPTIVE NOTE: Interim rept. Apr 86-Jun 87,

JUL 87 25P

PERSONAL AUTHORS: Warsi, Z. U.

REPORT NO. ASE-87-312

CONTRACT NO. AFOSR-85-0143

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1468

UNCLASSIFIED REPORT

ABSTRACT: (U) Numerical solution of the partial differential equations for the generation of surface grids requires a specification of the forcing function which depends on the geometry of the given surface. The data for the surface is usually in discrete form. Methods have been developed which fit a function over the given data. For complicated shapes, e.g., an airplane, the functional fit and the eventual grid generation for the fuselage and wings are done separately and then integrated later. Keywords: Grid generation; Curvilinear coordinates; Numerical methods; Computational fluid dynamics.

DESCRIPTORS: (U) *GRIDS(COORDINATES), *PARTIAL DIFFERENTIAL EQUATIONS, AIRCRAFT, COMPUTATIONS, COORDINATES, CURVES(GEOMETRY), ELLIPSES, FLUID DYNAMICS, FUSELAGES, GUIDED MISSILES, LINEAR SYSTEMS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, SOLUTIONS(GENERAL), SURFACES, WINGS, FITTING FUNCTIONS(MATHEMATICS).

IDENTIFIERS: (U) Forcing functions, Grid generation,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 631 CONTINUED

Computational fluid dynamics, Elliptics partial differential equations, PE61102F, WUAFOSR2304A3.

AD-A186 630 7/2

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) An Arbuzov-Like Reaction in the Trimethyl Phosphite-Eta2-Silaacyl Adduct (Eta5-C5Me5)Cl3Ta(Eta2-OC(SiMe3)(P(OMe)3)),

87 5P

PERSONAL AUTHORS: Arnold, John; Tilley, T. D.; Rheingold, Arnold L.; Geib, Steven J.

CONTRACT NO. AFOSR-85-0228

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-87-1401

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v26 n15 p2556-2559 1987.

ABSTRACT: (U) Our studies concerning the carbonylation chemistry of early transition metal silyl complexes have led to the discovery of Cp*C1 Ta (n-COSiMe) (1,Cp* =n -C Me), a reative n silaacyl derivative. Recently we have found that 1 readily reacts with Lewis bases to form complexes of the type Cp*C1 Ta OC(L)SiMe, in which the Lewis donor binds to the silaaclycarbon atom. Here we report the preparation and characterization of the trimethyl phosphite adduct Cp*C1 Ta ?n -OC(SiMe)P(OMe) (2) and its spontaneous Arbuzov-like dealkylation to MeC1 and Cp*C1 TaN-OC(SiMe)P(OMe)O (6). The latter compound, which has been characterized by X-ray crystallography, contains an unusual n-phosphonatosilaacy (2-) ligand. The dealkylation of trialkyl phosphites is promoted by a number of transition metal complexes. Dealkylation is usually preceded by coordination of phosphite to the transition metal. In a few cases this process appears to follow attack of the phosphite onto an electrophitic ligand bound to metal, as in the reaction reported here.

DESCRIPTORS: (U) *PHOSPHITES, *METHYL RADICALS, ATOMS, TRANSITION METALS, CRYSTALLOGRAPHY, X RAYS, LIGANDS, METALS, METAL COMPLEXES, REPRINTS.

AD-A186 631

AD-A186 630

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 630 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A186 584 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strong Consistency of Certain Information Theoretic Criteria for Model Selection in Calibration, Discriminant Analysis and Canonical Correlation Analysis.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 19P

PERSONAL AUTHORS: Nishii, R.; Bai, Z. D.; Krishnaiah, P. R.

REPORT NO. TR-86-42

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1005

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper shows that the criteria for model selection based upon efficient detection (ED) criterion are consistent for certain problems in multivariate calibration, discriminant analysis and canonical correlation analysis. These results will be proved under mild conditions on the underlying distribution.

DESCRIPTORS: (U) *INFORMATION THEORY, *MULTIVARIATE ANALYSIS, CALIBRATION, CORRELATION, DETECTION, DISCRIMINATE ANALYSIS, SELECTION, REGRESSION ANALYSIS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 630

AD-A186 584

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 583 12/6

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES COMPUTER RESEARCH INST

(U) Supercomputers for Solving PDE (Partial Differential Equations) Problems.

DESCRIPTIVE NOTE: Final rept. 20 Sep 86-11 Aug 87,

AUG 87 10P

PERSONAL AUTHORS: Hwang, Kai

CONTRACT NO. AFOSR-86-0008

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1275

UNCLASSIFIED REPORT

ABSTRACT: (U) This project investigated parallel/vector supercomputer architectures for solving Air Force problems, which demand the solution of partial differential equations (PDEs). We have developed an orthogonal multiprocessor (omp) architecture for efficiently implementing the SLOR and ADI methods in solving PDEs. Another parallel PDE machine architecture, called the V-tree multiprocessor, has been developed for mapping the multigrid algorithms. This V-tree is shown to be more effective than the well-known hypercube and mesh architectures. Both the OMP and the V-tree architectures can demonstrate linear speedup by exploiting parallelism and vectorization. Continued efforts are needed to expand these initial studies into real hardware experiments and software simulations to verify the theoretical predictions on speedup performance.

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *MULTIPROCESSORS, *SUPERCOMPUTERS, AIR FORCE, COMPUTER PROGRAMS, COMPUTERIZED SIMULATION, MESH, ORTHOGONALITY, PARTIAL DIFFERENTIAL EQUATIONS, PREDICTIONS, PROBLEM SOLVING, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A186 583

AD-A186 564 17/9 4/1 3/2

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) HF Radar Observations of Pulsations Near the Magnetospheric Cusp,

AUG 86

PERSONAL AUTHORS: Walker, A. D.; Greenwald, R. A.; Baker, K. B.

CONTRACT NO. N00024-85-C-5301, $NSF-ATM82-16571

MONITOR: AFOSR
TR-87-1460

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v91 nA8 p8919-8928, 1 Aug 86. Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The Goose Bay high frequency radar can be operated in a mode that allows the study of the temporal and spatial behaviour of pulsating phenomena with a time scale of minutes. On November 28, 1983, an event occurred during which long period pulsations were observed in the radar data. At this time, the field of view of the radar included a region of the cleft immediately to the east of the cusp. Combination of the radar data with HILAT magnetometer data had allowed the identification of the regions of the magnetosphere that mapped to the radar field of view. Pulsations with 10-min and 15-min periods were seen in a region mapping to the interior of the magnetosphere. They had high azimuthal wave number (17-25) and propagated eastward with a speed greater than 1 km/s. At the same time, eastward drifting patches of backscatter with a similar speed were seen in the region of antisunward convection that mapped either to the solar wind or the low-latitude boundary layer. A possible interpretation is that antisunward disturbances propagating along the magnetospheric boundary were driving surface waves within the magnetosphere. Possible types of disturbance that could cause such surface waves are flux-transfer events or Kelvin-Helmholtz waves.

DESCRIPTORS: (U) *BACKSCATTERING, *MAGNETOSPHERE, *RADAR, *SOLAR WIND, *SURFACE WAVES, AZIMUTH, BOUNDARIES, DRIFT,

AD-A186 564

AD-A186 564 CONTINUED

EAST(DIRECTION), FREQUENCY, INTERNAL, MAGNETOMETERS, PULSES, REPRINTS, SCALE, TIME.

AD-A186 542 7/4

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) High-Temperature Photoelectron Spectroscopy. An Increased Sensitivity Spectrometer for Studying Vapor-Phase Species Produced at Furnace Temperatures > 2000K.

86 19P

PERSONAL AUTHORS: Morris, A.; Dyke, J. M.; Josland, G. D.; Hastings, M. P.; Francis, P. D.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1679

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub.in High Temperature Science, v22 n1 p96-113 1986.

ABSTRACT: (U) The construction and performance of a photoelectron spectrometer designed for the vapor-phase study of high-temperature species is described. An inductively heated furnace is used to produce atoms and molecules in the vapor phase at furnace temperatures>2000K. Electrical interference is eliminated using pulsed heating and gated electronics. A microchannel plate phosphor silicon-intensified-target camera detector is used for rapid data acquisition to minimize problems caused by time-dependent contamination in the ionization region. A dedicated, menu-driven, firmware-based interface, with key pad control, is utilized. The TV monitoring of the photoelectron line images and use of a video window to select data allow optimum spectral conditions to be preserved during and experiment. Results show reductions in data acquisition times of up to 90 compared to equivalent single-channel detector experiments.

DESCRIPTORS: (U) *IONIZATION, *PHOTOELECTRON SPECTRA, *VAPOR PHASES, ACQUISITION, ATOMS, CHANNELS, CONTAMINATION, DATA ACQUISITION, DETECTORS, ELECTRICAL PROPERTIES, ELECTRONICS, FURNACES, GATES(CIRCUITS), HEAT,

AD-A186 542 CONTINUED

HEATING, HIGH TEMPERATURE, IMAGES, INTERFERENCE, LINE SCANNING, MOLECULES, OPTIMIZATION, PHOTOELECTRONS, PULSES, SENSITIVITY, SPECTRA, SPECTROMETERS, TIME DEPENDENCE, VIDEO SIGNALS, WINDOWS.

AD-A186 517 12/2 12/4

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF COMPUTER ENGINEERING AND SCIE NCE

(U) An Approximation Algorithm for the Maximum Independent Set Problem in Cubic Planar Graphs.

86 9P

PERSONAL AUTHORS: Choukhmane, Elarbi; Franco, John

CONTRACT NO. AFOSR-82-0331

MONITOR: AFOSR
TR-87-1696

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Networks, v16 p349-356 1986.

ABSTRACT: (U) A polynomial time approximation algorithm A for the problem of finding a maximal independent set for cubic planar graphs is presented. It is shown that M sub A > 6/7 in the case of cubic planar graphs and M sub A = 7/8 in the case of triangle free cubic planar graphs where M sub A is the worst-case ratio of the size of the independent set found by A to the size of the maximum independent set the graph input to A.

DESCRIPTORS: (U) *GRAPHS, *NONLINEAR PROGRAMMING, ALGORITHMS, POLYNOMIALS, TIME, RATIOS, REPRINTS.

IDENTIFIERS: (U) Bipartite graphs.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 514 12/3

CASE WESTERN RESERVE UNIV CLEVELAND OHIO DEPT OF COMPUTER ENGINEERING

(U) Probabilistic Analysis of Two Heuristics for the 3-Satisfiability Problem,

NOV 86 15P

PERSONAL AUTHORS: Chao, Ming-Te; Franco, John

CONTRACT NO. AFOSR-84-0372

MONITOR: AFOSR TR-87-1695

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl .of Computation, v15 n4 p1106-1118 Nov 86.

ABSTRACT: (U) An algorithms for the 3-Satisfiability problem is presented and a probabilistic analysis is performed. The analysis is based on an instance distribution which is parameterized to simulate a variety of sample characteristics. The algorithm assigns values to variables appearing in a given instance of 3-Satisfiability, one at a time, using the unit clause heuristic and a maximum occurring literal selection heuristic; at each step a variable is chosen randomly from a subset of variables which is usually large. The algorithm runs in polynomial time and it is shown that the algorithm finds a solution to a random instance of 3-Satisfiability with probability bounded from below by a constant greater than zero for a range of parameter values. The heuristics studied here can be used to select variables in a Backtrack algorithm for 3-Satisfiability. Experiments have shown that for about the same range of parameters as above the Backtrack algorithm using the heuristics finds a solution in polynomial average time.

DESCRIPTORS: (U) *HEURISTIC METHODS, *PROBABILITY, ALGORITHMS, POLYNOMIALS, TIME, PARAMETERS, SELECTION, VARIABLES, REPRINTS, BOOLEAN ALGEBRA.

IDENTIFIERS: (U) Backtrack algorithm, *Satisfiability problems.

AD-A186 514

AD-A186 508 12/3 12/9

RANDOM APPLICATIONS INC MONTROSE CO

(U) Dichotomous-Noise-Driven Oscillators,

APR 87

PERSONAL AUTHORS: Pawula, R. F.

CONTRACT NO. F49620-85-C-0093

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1680

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v35 n7 p3102-3108, 1 Apr 87.

ABSTRACT: (U) The problem of finding the probability density function of the output of an oscillator (a filter of higher order than the first) driven by dichotomous Markov noise (the random telegraph signal) is considered. No known theoretical methods are available for completely solving problems of this type. A somewhat general expression is derived for the output moments and an exact formulation for the probability density is presented in terms of Fokker-Planck type equations. However, partly because of irregularly shaped boundaries, the Fokker-Planck equations are complicated and remain unsolved except in the first-order case. The paper concludes with some Monte Carlo results for a second-order Butterworth filter. Keywords include: Reprints, Dichotomous Markov noise, Random telegraph signal, Probability density functions, - and Fokker-Planck equations.

DESCRIPTORS: (U) *FILTERS, *FOKKER PLANCK EQUATIONS, *OSCILLATORS, *PROBABILITY DENSITY FUNCTIONS, *SIGNALS, BOUNDARIES, EQUATIONS, METHODOLOGY, MOMENTS, MONTE CARLO METHOD, NORMAL DENSITY FUNCTIONS, OUTPUT, PROBLEM SOLVING, REPRINTS, SHAPE, TELEGRAPH SYSTEMS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 508

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 507 20/4

CINCINNATI UNIV OH

(U) Time-Consistent Pressure Relaxation Procedure for Compressible Reduced Navier-Stokes Equations,

JUL 87 11P

PERSONAL AUTHORS: Ramakrishnan, S. V.; Rubin, S. G.

CONTRACT NO. F49620-85-C-0027, N00014-79-C-0849

MONITOR: AFOSR TR-87-1701

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in AIAA Jnl., v25 n7 p905-913 Jul 87.

ABSTRACT: (U) A time consistent global pressure relaxation procedure of the unsteady, compressible, reduced Navier Stokes equations is presented. The shock capturing capability of the procedure is investigated with different forms of pressure gradient splitting. An efficient conservative method for capturing shocks is detailed. The transient behavior of laminar, high Reynolds number, low subsonic flow past a sine-wave airfoil geometry is analyzed using the new reduced Navier Stokes based algorithm. These solutions are compared with steady and unsteady results previously obtained with a modified interacting boundary-layer procedure. The strong influence of grid refinement and the type of differencing of the steamwise convection term on the existence or stability of separated laminar solutions is reaffirmed. More stable turbulent flow results are also presented. Finally, an unsteady solution for the flow past a finite flat plate at incidence is described in order to demonstrate the time accuracy of the algorithm.

DESCRIPTORS: (U) *COMPRESSIBLE FLOW, *NAVIER STOKES EQUATIONS, ACCURACY, AIRFOILS, BOUNDARY LAYER, CONVECTION, FLAT PLATE MODELS, GEOMETRIC FORMS, GRIDS, HIGH RATE, INTERACTIONS, LAMINAR FLOW, PRESSURE GRADIENTS, REDUCTION, RESPONSE, REYNOLDS NUMBER, SINE WAVES, SOLUTIONS(GENERAL), STABILITY, SUBSONIC FLOW, TRANSIENTS, TURBULENT FLOW, FLOW SEPARATION, TIME STUDIES, REPRINTS.

AD-A186 507

AD-A186 506 20/1

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

(U) The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in a Penetrable Medium,

87

PERSONAL AUTHORS: Colton, David; Monk, Peter

CONTRACT NO. AFOSR-86-0087

MONITOR: AFOSR TR-87-1699

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Quarterly Jnl. of Mechanics and Applied Mathematics, v40 pt 2, p189-212 1987.

ABSTRACT: (U) A projection theorem is obtained for the class of far field patterns of the acoustic transmission problem corresponding to time-harmonic incident plane waves propagating in arbitrary directions. This projection theorem depends on the eigenvalues of a new class of boundary value problems associated with the transmission problem. This projection theorem and the theory of Herglotz wave functions, is used to derive two distinct optimization schemes for solving the inverse transmission problem. Numerical examples are then given showing the practicality of the second of these two methods for solving the inverse transmission problem.

DESCRIPTORS: (U) *INVERSE SCATTERING, *SOUND TRANSMISSION, *ACOUSTIC SCATTERING, ACOUSTIC WAVES, BOUNDARY VALUE PROBLEMS, EIGENVALUES, FAR FIELD, HARMONICS, INVERSION, OPTIMIZATION, PATTERNS, PENETRATION, PLANE WAVES, TIME, TRANSMITTANCE, WAVE FUNCTIONS, REPRINTS.

IDENTIFIERS: (U) Herglotz wave fuctions, Inverse transmission problem, Projection theroems.

AD-A186 506

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 505 12/4

MARYLAND UNIV BALTIMORE COUNTY CATONSVILLE DEPT OF MATHEMATICS

(U) Bilinear Programming and Structured Stochastic Games,

APR 87 21P

PERSONAL AUTHORS: Filar, J. A.; Schultz, T. A.

CONTRACT NO. AFOSR-ISSA-87-0093, $NSF-ECS85-03440

MONITOR: AFOSR TR-87-1697

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Optimization Theory and Applications, v53 n1 p85-104 Apr 87.

ABSTRACT: (U) One-step algorithms are presented for two classes of structured stochastic games, namely, those with additive rewards and transitions and those which have switching controllers. Solutions to such classes of games under the average reward criterion can be derived from optimal solutions to appropriate bilinear programs. The validity of using bilinear programming as a solution method follows from two preliminary theorems, the first of which is a complete classification of undiscounted stochastic games with optimal stationary strategies. The second of these preliminary theorems relaxes the conditions of the classification theorem for certain classes of stochastic games and provides the basis for the bilinear programming results. Analogous results hold for the discounted stochastic games with the above special structures. (Reprints)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *LINEAR PROGRAMMING, ALGORITHMS, CLASSIFICATION, COMPUTER PROGRAMMING, OPTIMIZATION, REPRINTS, SOLUTIONS(GENERAL), STATIONARY, STRATEGY, THEOREMS, REPRINTS.

IDENTIFIERS: (U) *Bilinear programming.

AD-A186 502 12/3

TENNESSEE UNIV KNOXVILLE DEPT OF MATHEMATICS

(U) Series Representations of Infinitely Divisible Random Vectors and a Generalized Shot Noise in Banach Spaces.

DESCRIPTIVE NOTE: Interim rept. Apr-Jul 87,

JUL 87 33P

PERSONAL AUTHORS: Rosinski, Jan

CONTRACT NO. AFOSR-87-0136

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-0985

UNCLASSIFIED REPORT

ABSTRACT: (U) A generalised shot noise in Banach spaces is defined as the a.s. limit of certain centered sums of dependent random vectors; and, a necessary and sufficient condition for its existence is given. As an immediate application, the LePage-type series representations of infinitely divisible random vectors are obtained.

DESCRIPTORS: (U) *SHOT NOISE, *MATHEMATICAL ANALYSIS, BANACH SPACE, VECTOR ANALYSIS, SERIES(MATHEMATICS), POISSON DENSITY FUNCTIONS.

IDENTIFIERS: (U) Lepage representation, PE61102F, WUAFOSR2304A5.

AD-A186 499 12/3

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) On the Maximum Number of Constraints in Orthogonal Arrays.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 9P

PERSONAL AUTHORS: Hedayat, A.; Stufken, J.

REPORT NO. 87-3

CONTRACT NO. AFOSR-85-0320

MONITOR: AFOSR TR-87-0320

UNCLASSIFIED REPORT

ABSTRACT: (U) It is shown that Bush's bound for maximum number of constraints in an orthogonal array of index unity is uniformly better than Rao's bound. In addition it is shown, using an argument similar to that needed in the proof of the above result, that Noda's characterization of parameters in orthogonal arrays of strength 4 achieving equality in Rao's bound, leads easily to a similar characterization in arrays of strength 5. These results are useful designing experiments for quality control.

DESCRIPTORS: (U) *ARRAYS, *ORTHOGONALITY, INDEXES, QUALITY CONTROL, FACTORIAL DESIGN, INEQUALITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 493 15/3

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program. 1985 Technical Report. Volume 3.

DESCRIPTIVE NOTE: Final interim rept.,

APR 87 688P

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-87-1719

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, ADA-186 491.

ABSTRACT: (U) Topics include: Indoor radon pollution; Reliability of systems with random transfer of control; Advanced Propellent Formulations--Applications of new synthetic strategies to useful and energetic intermediates; Combustion of Liquid fuel sprays in stagnation flows; Monitoring environmental quality by metabolite analysis; Use of two simple, micro-based models in analysis of geotechnical test data; Role of antioxidant nutrients in preventing hyperbaric oxygen damage; Representation and propagation in hierarchical domains; Analysis of layered structures to resist blasts effects of conventional weapons; Case study analyses of millimeter wave length attenuation; Assessment of the stability and control computer program for conceptual aircraft design; Development of high strength beta titanium alloys via rapid solidification processing -- The coarsening of erbium oxide in Ti-15V-3Al-3Sn-3Cr Beta titanium alloy; Labeling the topographic features of an infrared image; Radiation from flying through nuclear debris clouds.

DESCRIPTORS: (U) *AIRCRAFT, *FUEL SPRAYS, *WEAPONS, ANTIOXIDANTS, ATTENUATION, COMBUSTION, COMPUTER PROGRAMS, CONTROL, DAMAGE, DEBRIS, DOMAIN WALLS, ENVIRONMENTS,

AD-A186 493 CONTINUED

ERBIUM COMPOUNDS, EXPERIMENTAL DATA, FLOW, FREQUENCY, HYPERBARIC CONDITIONS, INFRARED IMAGES, LAYERS, LIQUIDS, METABOLITES, MILLIMETER WAVES, MONITORING, NUCLEAR CLOUDS, NUTRIENTS, OXIDES, OXYGEN, POLLUTION, QUALITY, QUICK REACTION, RADON, RELIABILITY, SOLIDIFICATION, STABILITY, STAGNATION, STRUCTURES, TRANSFER.

AD-A186 492 15/3

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program. 1985 Technical Report. Volume 2.

DESCRIPTIVE NOTE: Final interim rept.,

APR 87 1006P

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-87-1718

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, ADA-186 493.

ABSTRACT: (U) Topics include: Optimum design of structures with multiple constraints; Solid fuel ramjet combustion flow; Automated image processing techniques for landsat thematic mapper data; Effect of high free stream turbulence and turbulent boundary layer flow and heat transfer; Detector placement and particle size interpretation for a multiple ratio single particle counter; Mantle flow structure beneath passive continent margins and the associated surface geoid responses; Photoluminescence excitation spectroscopy for III-V semiconductor characterization; Electrical and optical characterization of iodine-doped poly-p-phenylene-benzobis-thiazole (PBT); Synthesis of novel polybenzimidazoles; Multi-weapon multi-target multi-phase assignment problem; Route planning problem; Statistical performance measures -- Relating Air Force mission capability to base supply measures; Linkages between family factors and job attitudes in the Air Force; Dynamic task scheduling with resource requirements in hard real-time distributed computer system; Development of the two and three-dimensional grid optimization methods; Plasma source development; High performance liquid chromatography studies of thermal decomposition of 1.4-butanediammontium dinitrate; Beam profiling methods with improved

AD-A186 492 CONTINUED

resolution and dynamic range; Age-related changes in glycosaminoglycans from cornea using raman spectroscopy -- Instrument development; Adaptive grid generation techniques for transonic projectile base flow problems; Numerical modeling and inversion of 63 mm earthlimb emission from atomic oxygen; Validation of the elasto-viscoplastic finite element program; Microbiology of the Legionellae.

DESCRIPTORS: (U) *AIR FORCE OPERATIONS, *IMAGE PROCESSING, *PLANNING, *SEMICONDUCTORS, *TURBULENT FLOW, ADAPTIVE SYSTEMS, AIR FORCE, ATTITUDES(PSYCHOLOGY), AUTOMATION, BOUNDARY LAYER FLOW, CORNEA, DYNAMIC RANGE, DYNAMICS, EARTH MANTLE, EXCITATION, FLOW, FREE STREAM, GEOIDS, GRIDS, GROUP III COMPOUNDS, GROUP V COMPOUNDS, HEAT TRANSFER, JOBS, MAPPING, MATHEMATICAL MODELS, MICROBIOLOGY, MISSIONS, OPTIMIZATION, PHOTOLUMINESCENCE, PLASMAS(PHYSICS), POLYBENZIMIDAZOLE, RAMAN SPECTROSCOPY, REQUIREMENTS, RESOURCES, RESPONSE, SCHEDULING, SOURCES, SPECTROSCOPY, STATISTICAL ANALYSIS, STRUCTURES, SURFACES, SYNTHESIS(CHEMISTRY), TURBULENT BOUNDARY LAYER, VALIDATION.

AD-A186 492

AD-A186 491 14/2 5/2 15/3

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program. 1985 Technical Report. Volume 1.

DESCRIPTIVE NOTE: Final interim rept.,

APR 87 102OP

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-87-1717

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A186 492.

ABSTRACT: (U) Topics include: Individual differences in abilities, learning, and cognitive processes; Maximum voluntary hand grip torque for circular electrical connectors; Temperature dependence of ion molecule association reactions -- halide ion addition reactions; Metaphor and machines; A new look at case theory; Speech produced at various acceleration levels; Creating projected images; Computer-based instruction -- Effect of cognitive style, instructional format, and subject matter content; Nonlinear feedback controls for two-link robotic manipulators; AFWAL PNS algorithm and its relationship to heat transfer calculations at hypersonic velocities in comparison to classical boundary layer theory; X-ray rocking curve analysis characterization of undoped semi insulating GaAs; Experimental investigation of jet flames; Fourier transform of splines; Stochastic modelling of detonation locations; Evaluation of selected parameters which affect k sub d when measured using HPLC instrumentation; Effects of an applied electric field on the Inp melt; Below-melt-threshold excimer-laser annealing of GaAs; Simulator-based approach to training in aeronautical decision making; EPR and IR absorption study of semi-insulating gallium arsenide; Development of DNA probes for mycoplasma hominis and Ureaplasma

AD-A186 491

AD-A186 491 CONTINUED

urealyticum; Energetic materials via alkoxy-fluorinations of unsaturated systems with xenon difluoride; characterization of alkoxide derived zirconia toughened fused silica; Determination of the response of a BGO scintillator.

DESCRIPTORS: (U) *COMPUTER AIDED INSTRUCTION, *DECISION MAKING, *DEOXYRIBONUCLEIC ACIDS, *GALLIUM ARSENIDES, *HISTORY, *ION ION INTERACTIONS, *MYCOPLASMA, *TRAINING DEVICES, ABSORPTION, ACCELERATION, ADDITION REACTIONS, AERONAUTICS, ALGORITHMS, BOUNDARY LAYER, CIRCULAR, COGNITION, CONTROL, DETERMINATION, DETONATIONS, ELECTRIC CONNECTORS, ELECTRIC FIELDS, ENERGETIC PROPERTIES, FEEDBACK, FORMATS, FOURIER TRANSFORMATION, FUSED SILICA, GRAPHS, HALIDES, HANDS, HEAT TRANSFER, HYPERSONIC VELOCITY, IMAGES, INSTRUCTIONS, INSULATION, JET FLAMES, LEARNING, MATERIALS, MOLECULES, NONLINEAR SYSTEMS, POSITION(LOCATION), PROBES, RESPONSE, SIMULATORS, SPEECH, SPLINES, TEMPERATURE, TORQUE, XENON.

IDENTIFIERS: (U) PE61102F.

AD-A186 491

AD-A186 490 15/1

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION INC ST CLOUD FL

(U) United States Air Force Research Initiation Program. 1984 Research Reports. Volume 2.

DESCRIPTIVE NOTE: Final interim rept.,

MAY 86 979P

PERSONAL AUTHORS: Peele, Warren D.

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR TR-87-1721

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A186 489.

ABSTRACT: (U) Parametric Stability in Cost Estimating Models; Analysis of Air Force Vehicle Condition Ratings from Historical Data; The Development of Computational Efficiencies in Continuum Finite Element Codes Using Matrix Difference Equations; Centrifuge Model Study and Finite Element Analysis of Buried Concrete Box Culverts; Effects of Fluid Shifts and Hypovolemia individuals with Different Working Capabilities While Resting at a Five Degree Declination; Structure of Molten Imidazolium Chloride; Alternative Computational Methods for Separated Flows about Pitched Flat Surfaces; Functional Role of Serotonin in the Cerebellar Glomerular Synapse; Choline and Ethanolamine Phosphotransferase Activities in Glomerular Particles Isolated from Bovine Cerebellar Cortex; Dynamics of Large Scale Vortex Structures and Quasi-Large Scale Structures in the Wake of a Splitter Plate; Flow Physics Through a Pierced Membrane; Computational Studies of Ramjet Combustor Flow Fields; Free Stream Turbulence Effects on Turbulent Heat and Momentum Transfer; Study of Cold Reacting and Combusting Flows Around Bluff-Body Combustors; Numerical Modeling of Multiphase Turbulent Recirculating Flows in Sudden-Expansion Ramjet Geometry; SiC Fiber Reinforced Glass-

AD-A186 490

AD-A186 490 CONTINUED

Ceramic Composites in the Zirconia/Magnesium Aluminosilicate System.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, BLOOD VOLUME, BOVINES, BOXES, BURIED OBJECTS, CENTRIFUGES, CERAMIC MATERIALS, CEREBELLUM, CHANNELS(WATERWAYS), CHOLINES, CODING, COMBUSTORS, COMPUTATIONS, CONCRETE, COST ESTIMATES, COST MODELS, DYNAMICS, EFFICIENCY, FIBER REINFORCED COMPOSITES, FINITE ELEMENT ANALYSIS, FLOW FIELDS, FLOW SEPARATION, FLUIDS, FREE STREAM, GLASS, GLOMERULI, HEAT, LOW LEVEL, MATHEMATICAL MODELS, MODELS, MOMENTUM TRANSFER, NUMERICAL METHODS AND PROCEDURES, PARTICLES, SILICON CARBIDES, PARAMETRIC ANALYSIS, FREE STREAM, RAMJET ENGINES, SEROTONIN, SHIFTING, ALUMINUM COMPOUNDS, SILICATES, BLUNT BODIES, TURBULENCE, VORTICES, WAKE.

AD-A186 490

AD-A186 489 15/1

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION INC ST CLOUD FL

(U) United States Air Force Research Initiation Program. 1984 Research Reports. Volume 1.

DESCRIPTIVE NOTE: Final interim rept.,

MAY 86 979P

PERSONAL AUTHORS: Courter, Robert W.

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR TR-87-1720

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A186 490.

ABSTRACT: (U) Contents: Effect of Pole Pieces on the Axial Magnetic Field in Traveling Wave Tubes; An Analytical Study of Two-Stage Light Gas Gun Performance; A Low-Cost Local Area Network for Desktop Computers; Development of Prediction Models For Human Torque Strength; The Role of Antioxidant In Preventing Hyperbaric Oxygen Damage to the Retina; The Influence of Melting and Reactant Consumption on Temperature Transients in Spherical and Cylindrical Charges of EAK; Geostrophic Adjustment in a Three Dimensional MESOSCAL Numerical Model of the Atmosphere; Effect of Temperature and Reactant Solution Upon The Rate of Gas-Phase Ion Molecule Reactions; Effects of Nuclear Radiation on the Optical Characteristics of Laser Components; Computer Simulation of Aircraft Surface Dynamics; Computation of Transonic Projectile Aerodynamics; Use of Bayesian Decision Theory in Assessing the Portability of Ground Water Based Drinking Water Supplies; Design of a Digital Electronic-Warfare Passive Receivers; Dual Channel FFT Systems Analysis Facility for Assessing Integrated Communication Systems; Far Infrared Absorption Profiles for Distributed Shallow Donors in GAAS-GAALAS Heterostructures.

AD-A186 489

AD-A186 489 CONTINUED

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AERODYNAMICS, AIRCRAFT, ALUMINUM GALLIUM ARSENIDE, ANTIOXIDANTS, BAYES THEOREM, COMMUNICATION AND RADIO SYSTEMS, ELECTRON DONORS, CONSUMPTION, DAMAGE, DECISION THEORY, DIGITAL SYSTEMS, DISTRIBUTION, COMPUTERIZED SIMULATION, DUAL CHANNEL, DYNAMICS, ELECTRONIC WARFARE, MICROCOMPUTERS, COMPUTER COMMUNICATIONS, FAR INFRARED RADIATION, ATMOSPHERE MODELS, GEOSTROPHIC WIND, GALLIUM ARSENIDE LASERS, HUMANS, HYPERBARIC CONDITIONS, INTEGRATED SYSTEMS, ION ION INTERACTIONS, LASER COMPONENTS, LOW COSTS, MAGNETIC FIELDS, MATHEMATICAL MODELS, MELTING, MODELS, MOLECULES, NETWORKS, NUCLEAR RADIATION, OPTICAL PROPERTIES, OXYGEN, PASSIVE SYSTEMS, PHASE, PREDICTIONS, PROJECTILES, REACTANTS(CHEMISTRY), REACTIVE GASES, RECEIVERS, REPLACEMENT, RETINA, SHALLOW DEPTH, SOLUTIONS(GENERAL), STIMULATION(GENERAL), WATER SUPPLIES, SURFACES, SYSTEMS ANALYSIS, HETEROJUNCTIONS, TEMPERATURE, TORQUE, TRANSIENTS, TRANSONIC FLOW, TRAVELING WAVE TUBES.

IDENTIFIERS: (U) Local area networks, Ion molecule interactions.

AD-A186 476 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) A Transformation/Weighting Model for Estimating Michaelis-Menten Parameters,

FEB 87 29P

PERSONAL AUTHORS: Carroll, Raymond J.; Cressie, Noel; Ruppert, David

REPORT NO. MIMEO-SER-1712

CONTRACT NO. F49620-85-C-0144, $NSF-MCS81-00748

MONITOR: AFOSR
TR-87-1414

UNCLASSIFIED REPORT

ABSTRACT: (U) There has been considerable disagreement about how best to estimate the parameters in Michaelis-Menten models. This document points out that many fitting methods are based on different stochastic models, being weighted least squares estimates after appropriate transformation. The authors propose a flexible model which can be used to help determine the proper transformation and choice of weights. The method is illustrated by examples. Keywords: Nonlinear regression; Lineweaver Burke transformation.

DESCRIPTORS: (U) *WEIGHTING FUNCTIONS, ESTIMATES, LEAST SQUARES METHOD, MATHEMATICAL MODELS, FITTING FUNCTIONS(MATHEMATICS), PARAMETERS, NONLINEAR ANALYSIS, REGRESSION ANALYSIS, STOCHASTIC PROCESSES, WEIGHT.

IDENTIFIERS: (U) Lineweaver Burke models, Michaelis-Menten parameters.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 435 9/3

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Calculations of O2 Absorption and Fluorescence at Elevated Temperatures for a Broadband Argon-Fluoride Laser Source at 193nm.

DESCRIPTIVE NOTE: Journal article,

86 17P

PERSONAL AUTHORS: Lee, Michael P.; Hanson, Ronald K.

CONTRACT NO. AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-1218

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Quant. Spectrosc. Radiat. Transfer, v36 n5 p425-440 1986.

ABSTRACT: (U) Calculations have been made of O2 absorption and fluorescence in the Schumann-Range B from X band system for excitation by a broadband argon fluoride excimer laser at 193nm. Results are presented for line strengths, spectral absorption coefficients, relative fluorescence spectra, total fluorescence and integrated absorption coefficients. The calculations have been performed for 300, 500, 1000, 1500 and 2000 K, a range of temperatures typically found in combustion flows. The absorption coefficients and fluorescence yields found are very large enough to encourage use of argon fluoride lasers for O2 measurements in a variety of flows. Keywords: Laser, Fluorescence, Imaging oxygen, Excimer, Absorption.

DESCRIPTORS: (U) *ABSORPTION, *ARGON LASER, *FLUORIDES, *OXYGEN, ABSORPTION COEFFICIENTS, ABSORPTION SPECTRA, COMBUSTION, FLOW, FLUORESCENCE, HIGH TEMPERATURE, IMAGES, INTEGRATED SYSTEMS, LASERS, SPECTRA, STRENGTH(GENERAL), TEMPERATURE, X BAND, YIELD, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A186 435

AD-A186 433 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Strong Representation of Weak Convergence.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Sep 87,

JUN 87 8P

PERSONAL AUTHORS: Bai, Z. D.; Liang, W. Q.; Vervaat, W.

REPORT NO. TR-186

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1354

UNCLASSIFIED REPORT

ABSTRACT: (U) This result is proved. If sub n is a separable metric space for n<or = infinity, phi sub n: S sub n approaches limit of S sub infinity is measurable for < sub infinity, X sub n is an S sub n valued random variable for n<or = infinity and phi sub n (X sub n) approaches limit of sub x sub infinity in S sub infinity, then there exists S sub n valued random variables X sub n such that X sub n = d sub x sub n for n<or = infinity and phi sub n (X sub n) approaches limit of X sub infinity wpl. Conditions on S sub n and phi sub n are presented that allow a construction in the context of Polish spaces.

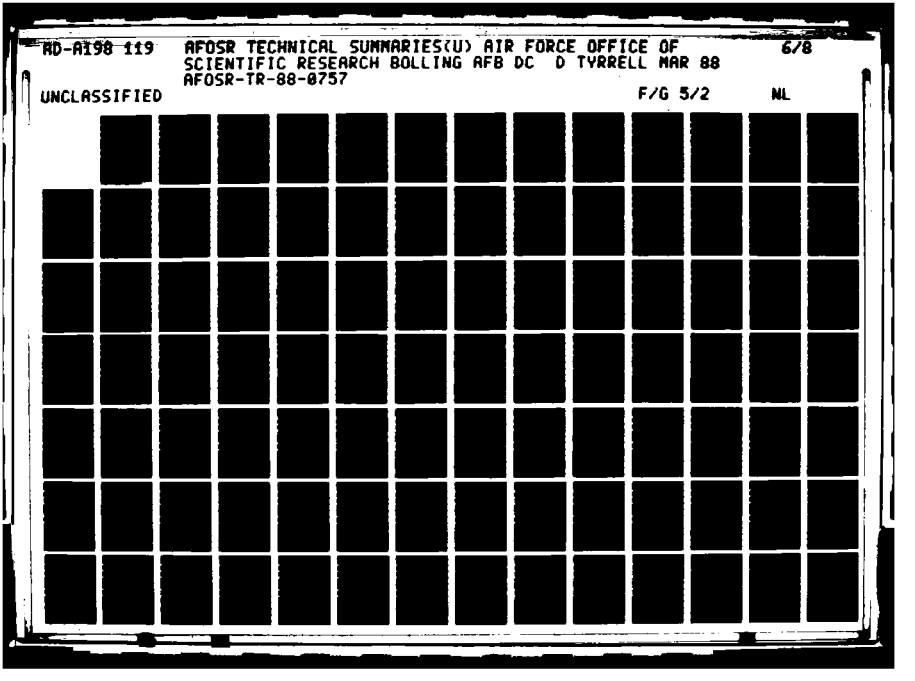
DESCRIPTORS: (U) *WEAK CONVERGENCE, *MATRIX THEORY, *PROBABILITY DISTRIBUTION FUNCTIONS, LIMITATIONS, RANDOM VARIABLES.

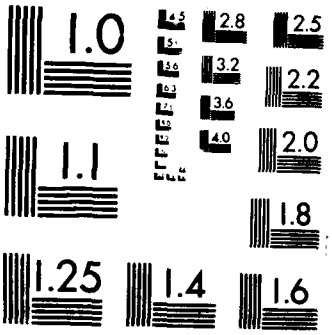
IDENTIFIERS: (U) Polish Space, Representation Theorems, Skorohod Theorem, PE61102F, WUAFOSR2304A5.

AD-A186 433

AD-A198 119 AFOSR TECHNICAL SUMMARIES(U) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC D TYRRELL MAR 88 AFOSR-TR-88-0757 6/8

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 432 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Local Properties of Index-Alpha Stable Fields.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

DEC 86 22P

PERSONAL AUTHORS: Nolan, John P.

REPORT NO. TR-171

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1059

UNCLASSIFIED REPORT

ABSTRACT: (U) This document examines the paths of the stable fields that are the analogs of index-beta Gaussian fields. The author finds Holder conditions on their paths and finds the Hausdorff dimension of the image, graph, and level sets when we have local nondeterminism, generalizing the Gaussian results. Keywords: inversion; random variables.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, GRAPHS, RANDOM VARIABLES, STABILITY.

IDENTIFIERS: (U) Hausorff Dimensions, Lebesgue Measure, PE61102F, WUAFSOR2304A5.

AD-A186 431 6/4 12/3 12/9

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) The Filtering Problem for Infinite Dimensional Stochastic Processes.

DESCRIPTIVE NOTE: Technical rept. Oct 86-Sep 87,

JAN 87 12P

PERSONAL AUTHORS: Kallianpur, G.; Karandikar, R. L.

REPORT NO. TR-175

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1131

UNCLASSIFIED REPORT

ABSTRACT: (U) The paper presents some recently obtained results on the nonlinear filtering problem for infinite dimensional processes. The optimal filter is obtained as the unique solution of certain measure valued equations. Robustness properties - both pathwise and statistical - are given and a preliminary result shows consistency with the stochastic calculus theory. Applications to random fields and models of voltage potential in neurophysiology are briefly discussed. Keywords: Markov processes; white noise.

DESCRIPTORS: (U) *FILTERS, *MARKOV PROCESSES, *NEUROPHYSIOLOGY, *NONLINEAR SYSTEMS, *STOCHASTIC PROCESSES, *WHITE NOISE, CALCULUS, EQUATIONS, MODELS, OPTIMIZATION, SIZES(DIMENSIONS), THEORY, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 430 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Weak Convergence of Sums of Moving Averages in the Alpha-Stable Domain of Attraction.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

JUN 87 30P

PERSONAL AUTHORS: Avram, Florin

REPORT NO. TR-191

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1087

UNCLASSIFIED REPORT

ABSTRACT: (U) Skorohod has shown that the convergence of sums of i.i.d. random variables to an alpha-stable Levy process, with 0<alpha<2, holds in the weak J sub 1 sense. It is shown that for sums of moving averages with at least 2 non-zero coefficients, weak J sub 1 convergence cannot hold, however, if the moving average coefficients are positive, weak M sub 1 convergence usually does hold. Keywords: bisection method; sequences (mathematics).

DESCRIPTORS: (U) *COEFFICIENTS, *WEAK CONVERGENCE, LOW STRENGTH, MEAN, RANDOM VARIABLES.

IDENTIFIERS: (U) *Moving averages, PE61102F, WUAFOSR2304A5.

AD-A186 429 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Series Representations of Infinitely Divisible Random Vectors and a Generalized Shot Noise in Banach Spaces.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

JUL 87 34P

PERSONAL AUTHORS: Rosinski, Jan

REPORT NO. TR-195

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1148

UNCLASSIFIED REPORT

ABSTRACT: (U) A generalized shot noise in Banach spaces is defined as the a.s. limit of certain centered sums of dependent random vectors; and, a necessary and sufficient condition for its existence is given. As an immediate application, the LePage-type series representations of infinitely divisible random vectors are obtained. Keywords: Stochastic processes; Convergence; Hilbert space.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *POISSON DENSITY FUNCTION, BANACH SPACE, HILBERT SPACE, SHOT NOISE, VECTOR ANALYSIS.

IDENTIFIERS: (U) Martingales, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 428 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) On the Extreme Order Statistics for a Stationary Sequence.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

JUL 87 25P

PERSONAL AUTHORS: Hsing, Tailen

REPORT NO. TR-198

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1063

UNCLASSIFIED REPORT

ABSTRACT: (U) This document describes a strictly stationary sequence of random variables which satisfies the strong mixing condition (also known as uniform or alpha-mixing). Keywords: Normalizing functions; Weak convergence; Continuous distribution; Extreme values; Point processes.

DESCRIPTORS: (U) *ORDER STATISTICS, *WEAK CONVERGENCE, MIXING, RANDOM VARIABLES, RANGE(EXTREMES), SEQUENCES, STATIONARY, VALUE, NORMALIZING(STATISTICS), STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 428

AD-A186 427 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) On the Characterization of Certain Point Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

AUG 87 23P

PERSONAL AUTHORS: Hsing, Tailen

REPORT NO. TR-199

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1064

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well known that point process methods can be applied effectively to study certain types of problems in statistical extreme value theory. Consider a strictly stationary sequence of random variables (xi sub j) indexed by the set of integers I=Z. One can define a number of interesting point processes in one dimension by recording the positions where extreme values occur. For example, an extremal process typically is one that records the indices (properly normalized) at which record values of xi sub 1, xi or sub 2 occur, and an exceedance point process considered by Leadbetter consists of the set of points j,n: xi sub j > w sub n, where sub n is a suitable sequence of constants. For this type of processes, Poisson or compound Poisson convergence results can often be derived under suitable mixing conditions. Keywords: Weak convergence.

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS, *WEAK CONVERGENCE, *POINT THEOREM, CONSTANTS, CONVERGENCE, MIXING, RANDOM VARIABLES, RANGE(EXTREMES), SEQUENCES, STATIONARY, STATISTICS, THEORY, VALUE.

IDENTIFIERS: (U) *Extreme value functions, Point Processes, PE61102F, WUAFOSR2304A5.

AD-A186 427

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 426 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Admissible and Singular Translates of Stable Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

AUG 87 43P

PERSONAL AUTHORS: Marques, Mauro; Cambanis, Stamatis

REPORT NO. TR-201

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1119

UNCLASSIFIED REPORT

ABSTRACT: (U) Translates of symmetric stable and other p sub th order processes are considered. An upper bound for the set of admissible translates of a general p sub th order process is presented, which is a partial analog of the reproducing kernel Hilbert space of a second order process. For invertible stable processes a dichotomy is established, i.e. each translate is either admissible or singular, and the admissible translates are characterized. As a consequence, most continuous time moving averages and all harmonizable processes with nonatomic spectral measure have no admissible translate; and the admissible translates of a general harmonizable process are characterized. The translates of a mixed autoregressive moving averages stable sequence are shown to coincide with those of the Gaussian case.

DESCRIPTORS: (U) *FUNCTIONAL ANALYSIS, ANALOG SYSTEMS, HILBERT SPACE, MEAN, MOTION, STABILITY, TIME, KERNEL FUNCTIONS, BANACH SPACE.

IDENTIFIERS: (U) Borel Space, *Order processes, Lebesgue measure, PE61102F, WUAFOSR2304A5.

AD-A186 425 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) On Hypercontractivity of Alpha-Stable Random Variables, 0 < Alpha < 2.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

JUL 87 16P

PERSONAL AUTHORS: Szulga, Jerzy

REPORT NO. TR-196

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1121

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Introduction; properties of hypercontractive random variables; hypercontractivity on the real line; hypercontractivity in normal spaces. Keywords: Stochastic processes; Inequalities.

DESCRIPTORS: (U) *RANDOM VARIABLES, STOCHASTIC PROCESSES, STABILITY.

IDENTIFIERS: (U) Hypercontractivity, PE61102F, WUAFOSR2304A5.

AD-A186 426

AD-A186 425

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 424 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Harald Cramer 1893 - 1985.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

JUL 87 25P

PERSONAL AUTHORS: Leadbetter, M. R.

REPORT NO. TR-192

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1120

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a reprint version of an article written at the request of the International Statistical Review. The article is organized in three main sections. The first of these is a brief overview of Harald Cramer's life and career. The second (and main) section is an account of his work in Probability and Statistics, with historical perspective where possible. The third, final section contains personal comments and recollections from the author's own contacts with Harald Cramer. These are intended to complement the description of the career and scientific contributions of Cramer, with some glimpses of his personal qualities. Keywords: Stationary processes; Insurance risk; Markov processes.

DESCRIPTORS: (U) *STATISTICS, *BIOGRAPHIES, CAREERS, INSURANCE, MARKOV PROCESSES, REPRINTS, RISK, STATISTICAL PROCESSES.

IDENTIFIERS: (U) *Statisticians, PE61102F, WUAFOSR2304A5.

AD-A186 424

AD-A186 412 12/3

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) A Stochastic Control Problem with Different Value Functions for Singular and Absolutely Continuous Control.

DESCRIPTIVE NOTE: Journal article,

DEC 86 7P

PERSONAL AUTHORS: Heinricher, Arthur C., Jr.; Mizel, Victor J.

CONTRACT NO. AFOSR-85-0360

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-87-1253

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the IEEE Conference on Decision and Control (25th), p134-139, 10-12 Dec 86.

ABSTRACT: (U) A stochastic control problem is obtained as a small noise approximation to a deterministic optimal control problem. Two classes of admissible controls are considered and the optimal control policies are explicitly determined for a each admissible class. The larger admissible class contains controls referred to as singular stochastic controls. For this class, the cumulative effect of control has bounded variation trajectories. The smaller admissible class contains the standard stochastic controls whose cumulative effect has absolutely continuous trajectories. These controls are referred to as absolutely continuous controls. the optimal singular control provides a cost strictly smaller than the minimum cost achievable when only absolutely continuous stochastic controls are admissible. In particular, this shows that is not always possible to approach the optimal cost for singular control is only the standard stochastic control policies are admissible. Keywords: Hamilton-Jacobi-Bellman equation.

AD-A186 412

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 412 CONTINUED

DESCRIPTORS: (U) *STOCHASTIC CONTROL, COSTS, DETERMINATION, NOISE, OPTIMIZATION, POLICIES, STOCHASTIC PROCESSES, TRAJECTORIES, VARIATIONS.

IDENTIFIERS: (U) WUAFOSR2304A9, PE61102F.

AD-A186 412

AD-A186 408 12/2 20/4

STANFORD UNIV CA DEPT OF MATHEMATICS

(U) Classroom Notes in Applied Mathematics,

84 9P

PERSONAL AUTHORS: Verman, Ghasi R.; Keller, Joseph B.

CONTRACT NO. AFOSR-85-0007

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1252

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Seminar on Nonlinear Partial Differential Equations, p99-115 1984.

ABSTRACT: (U) Free boundary problems are defined and illustrated by several problems in mechanics. First the problem of finding the free surface of a liquid in hydrostatic equilibrium is considered. Then the effect of surface tension is taken into account. Finally the contact of an inflated membrane, such as a balloon or tire, with a solid surface is formulated. This problem is solved by the method of matched asymptotic expansions when the contact area is small. Keywords: reprints; hydrostatics; surface tension; axial symmetry.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *HYDROSTATICS, APPLIED MATHEMATICS, ASYMPTOTIC SERIES, BALLOONS, EQUILIBRIUM(GENERAL), EXPANSION, INTERFACIAL TENSION, MATCHING, REPRINTS, SOLIDS, SURFACES, SYMMETRY, AXISYMMETRIC, INFLATABLE STRUCTURES, TIRES, NONLINEAR DIFFERENTIAL EQUATIONS, PARTIAL DIFFERENTIAL EQUATIONS, MECHANICS, REPRINTS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 407 21/3 9/3

TENNESSEE UNIV SPACE INST TULLAHOMA

(U) Laser Thermal Propulsion.

DESCRIPTIVE NOTE: Final rept. 1 Jan 83-31 Aug 86,

JUN 87 9P

PERSONAL AUTHORS: Keefer, Dennis

CONTRACT NO. AFOSR-83-0043

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-87-1270

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research investigation was to determine, experimentally and analytically, the physical mechanisms that control the behavior of continuous, laser sustained plasmas. The principle questions involve the effects of a forced convection environment and optical geometry on the stability, fractional power absorption, plasma structure, and fluid mixing. A continuous, 1.5 kW, axial flow, carbon dioxide laser was used to create the LSP in a cylindrical quartz flow channel. The convection flowfield surrounding the plasma was controlled by the volume flow through the test chamber, and the optical geometry was determined by the unstable oscillator output mode of the laser and the focal length of the lens. Digital images of the plasma in a selected narrow wavelength interval were obtained using a CID digital camera and a VICOM digital image processing computer that were calibrated for absolute radiance. These images were then Abel inverted to give a spatial plasma emission coefficient which determined the spatial distribution of the plasma temperature. These measured temperature fields were then used to calculate the laser power absorption in the plasma and the power lost from the plasma through optically thin emission. More than one hundred sets of data were obtained for argon plasmas at nominal pressures from 1.5 to 3 atmospheres and incident flow velocities from 0.4 to 4.0 m/s.

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DESCRIPTORS: (U) *THERMAL PROPULSION SYSTEMS, *LASER APPLICATIONS, ABSORPTION, ARGON, AXIAL FLOW, CARBON DIOXIDE LASERS, CHAMBERS, CHANNELS, COEFFICIENTS, CONVECTION, CYLINDRICAL BODIES, DIGITAL COMPUTERS, DIGITAL SYSTEMS, EMISSION, FLOW, FLOW FIELDS, FLUIDS, FREQUENCY, GEOMETRY, IMAGE PROCESSING, IMAGES, INTERVALS, LASERS, LENGTH, MIXING, OPTICAL PROPERTIES, OSCILLATORS, OUTPUT, PLASMAS(PHYSICS), POWER, QUARTZ, RADIANCE, SPATIAL DISTRIBUTION, TEMPERATURE, TEST FACILITIES, VELOCITY, VOLUME, EMISSION SPECTROSCOPY.

IDENTIFIERS: (U) *Laser thermal propulsion, *Laser produced plasmas, Abel inversion, Argon plasmas, Plasma spectroscopy, WUAFOSR2308A1, PE61102F.

AD-A186 407

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 406 20/4

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF MECHANICAL AND AEROSPACE ENGIN EERING

(U) Nonlinear and Nonparallel Stability Problems.

DESCRIPTIVE NOTE: Final rept. Jul 84-Nov 86,

JUN 87 7P

PERSONAL AUTHORS: Reshotko, E.

CONTRACT NO. AFOSR-84-0148

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1276

UNCLASSIFIED REPORT

ABSTRACT: (U) An analysis was developed describing the spatial parallel flow development of disturbances that are introduced into an incompressible laminar boundary layer by a vibrating ribbon at the wall. The dominant mode is corresponding to the eigenmode of the flow at the ribbon frequency, as found by Gaster, but the solution technique does not require the questionable assumptions previously invoked. Analysis of the Compressibility introduces additional complexities, including the stagnation enthalpies of the two streams, and admits influences of higher acoustical modes. Keywords: Compressible free shear layers.

DESCRIPTORS: (U) *LAMINAR BOUNDARY LAYER, *INCOMPRESSIBLE FLOW, ACOUSTICS, COMPRESSIVE PROPERTIES, ENTHALPY, FLOW, INCOMPRESSIBILITY, LAYERS, NONLINEAR SYSTEMS, SHEAR PROPERTIES, SOLUTIONS(GENERAL), SPATIAL DISTRIBUTION, STABILITY, STAGNATION, VIBRATION, VIBRATION, COVERINGS, FOURIER TRANSFORMATION, PARALLEL ORIENTATION.

IDENTIFIERS: (U) Initial value problems.

AD-A186 406

AD-A186 405 11/6.2 9/3

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) One-Dimensional Diffusion Model for Extended Solid Solution in Laser Cladding.

DESCRIPTIVE NOTE: Annual rept.,

APR 87 12P

PERSONAL AUTHORS: Kar, A.; Mazumder, J.

REPORT NO. UILU-LAMP-AF02

CONTRACT NO. AFOSR-85-0333

MONITOR: AFOSR
TR-87-1262

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Physics, v61 n7 p2645-2175, 1 Apr 87.

ABSTRACT: (U) A mathematical model is presented for determining the composition of extended solid solution formed due to rapid cooling in laser cladding. This model considers a diffusion mechanism for mass transport in a one-dimensional semi-infinite molten pool of the cladding material from which heat is removed by conduction through a one dimensional semi-infinite solid substrate. The rate of solidification has been obtained by modeling the cooling process as a composite medium heat transfer problem. The discontinuity of the concentration field has been simulated using a nonequilibrium partition coefficient, and then a nonsimilar exact solution for the mass transport equation has been obtained using a set of similarity variables which has been derived using Lie group theory.

DESCRIPTORS: (U) *CLADDING, *DIFFUSION, *LASERS, COEFFICIENTS, COOLING, EQUATIONS, GROUPS(MATHEMATICS), HIGH RATE, LIE GROUPS, MASS TRANSFER, MATERIALS, MATHEMATICAL MODELS, MODELS, ONE DIMENSIONAL, RATES, SOLID SOLUTIONS, SOLIDIFICATION, TRANSPORT PROPERTIES, REPRINTS.

AD-A186 405

AD-A186 404 12/1 20/11

MARYLAND UNIV COLLEGE PARK INST FOR PHYSICAL SCIENCE AND TECHNOLOGY

(U) Theoretical Investigations of Chaotic Dynamics

DESCRIPTIVE NOTE: Final rept. 15 Jun 81-29 Nov 86,

JAN 87 4P

PERSONAL AUTHORS: Yorke, James A.

CONTRACT NO. AFOSR-81-0217

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1272

UNCLASSIFIED REPORT

ABSTRACT: (U) Problems arising in the area of nonlinear vibrations were studied. Essentially equations such as that for a periodically forced, damped pendulum are capable of exhibiting behavior which was unsuspected even 10 years ago and the principal investigator was in the forefront to the effort to explain these mysteries. It was he who coined the term 'chaos' and the students and publications here identified are confined to that topic. Dr. Yorke reports on work to determine the factual dimension of attracting sets for differential equations together with some vigorous results on the dependence of such sets on equation parameters.

DESCRIPTORS: (U) *ENTROPY, *MATHEMATICAL ANALYSIS, DAMPING, DIFFERENTIAL EQUATIONS, DYNAMICS, NONLINEAR SYSTEMS, VIBRATION, THEORY, LYAPUNOV FUNCTIONS, PENDULUMS.

IDENTIFIERS: (U) *Chaos, WUAFOSR2304A4, PE61102F.

AD-A186 404

AD-A186 403 21/2 21/4

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Investigation of Fuel Additive Effects on Sooting Flames.

DESCRIPTIVE NOTE: Annual rept.,

JUN 87 14P

PERSONAL AUTHORS: Bonczyk, Paul A.

REPORT NO. UTRC/R87-957464-A

CONTRACT NO. F49620-86-C-0054

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1283

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research is to clarify the mechanisms responsible for the suppression of soot in flames by fuel additives. Measurements are limited to well-defined hydrocarbon/air prevaporized liquid- and gaseous-fueled flames. Emphasis is given to ferrocene in a diffusion flame fueled by prevaporized iso-octane. Nonperturbing laser/optical diagnostic techniques are used to relate changes in soot particulate size, number density, and volume fraction to additive concentration. Ferrocene is observed to suppress a visible soot plume completely and, in general, to intervene at a late combustion stage. Suppression is due to both size and number density reduction, which suggests that ferrocene enhances the oxidative burn-out of soot. In contrast, at an early combustion stage nearer the burner lip, a slight enhancement of soot observed with ferrocene seeding. Keywords: Additive, Ferrocene, Flame, Soot.

DESCRIPTORS: (U) *ADDITIVES, *FLAMES, *FUEL ADDITIVES, *SOOT, AIR, BURNOUT, COMBUSTION, CONCENTRATION(CHEMISTRY), DENSITY, DIAGNOSIS(GENERAL), FERROCENES, HYDROCARBONS, LASERS, METHODOLOGY, OPTICS, OPTIMIZATION, OXIDATION, PARTICLE SIZE, PARTICULATES, PLUMES, REDUCTION, SEEDING,

AD-A186 403

AD-A186 403 CONTINUED

SUPPRESSION, VISIBLE SPECTRA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A186 398 20/7

OREGON UNIV EUGENE DEPT OF PHYSICS

(U) Science with Synchrotron Radiation and a Heavy-Ion Storage Ring,

87 19P

PERSONAL AUTHORS: Jones, K. W.; Johnson, B. M.; Meron, M.; Crasemann, B.; Hahn, Y.

CONTRACT NO. AFOSR-87-0026, $DE-AC02-76CH000016

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-87-1049

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. on Atomic and Molecular Physics, v20 n1 p1-18 1987.

ABSTRACT: (U) A variety of scientific investigations of outstanding interest are now possible using an atomic physics facility (APF) based on the combination of an undulator or wiggler a: a high-brilliance synchrotron light source, a synchrotron storage ring for heavy ions, and a tandem accelerator or other source of highly ionized atoms for filling the storage ring. The APF opens dazzling new vistas for qualitatively new experiments in atomic physics and related fields since it gives improved reaction rates, provides refined energy resolution, and produces copious quantities of multiply ionized atoms in well-defined states. The APF represents a way of combining new techniques into a powerful, well-coordinated facility to deal comprehensively with the new atomic physics. The science that can be done with the APF is discussed mainly from the general view of what can be done with synchrotron radiation. The storage ring can also be used completely independently with lasers or to study ion-electric, ion-atom, or ion-ion interactions. Together, electron and heavy-ion storage rings provide an extraordinarily large number of ways of preparing and probing atoms and molecules. By employing complementary experimental methods at a single facility, the APF makes it possible to choose the very best experimental

AD-A186 398 CONTINUED

solutions to the complex measurements now necessary for frontier atomic physics experiments. Keywords: Heavy ion physics, Synchrotron radiation, Atomic physics.

DESCRIPTORS: (U) *SYNCHROTRONS, *NUCLEAR RADIATION, ELECTROSTATIC ACCELERATORS, ENERGY, HEAVY IONS, ION ION INTERACTIONS, IONIZATION, LASERS, MEASUREMENT, MOLECULES, NUCLEAR PHYSICS, RADIATION, RATES, REACTION TIME, RESOLUTION, RINGS, SOLUTIONS(GENERAL), STORAGE, PHOTOIONIZATION, REPRINTS.

IDENTIFIERS: (U) *Storage Rings, *Synchrotron Radiation.

AD-A186 396 7/4 20/5

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Comparison of Benzene Adsorption on Ni(111) and Ni(100)

87 4P

PERSONAL AUTHORS: Myers, A. K.; Schoofs, G. R.; Benziger, J. B.

CONTRACT NO. AFOSR-82-0302

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-87-1281

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 n9 p2230-2232 1987.

ABSTRACT: (U) The adsorption of benzene on the Ni (100) and the Ni (111) crystal faces was compared in order to investigate the effect of crystallographic orientation on the interaction of benzene with nickel. Temperature programmed reaction (TPR) was used to characterize adsorption bond strengths and determine product distributions. Benzene was found to adsorb 44 kJ/mol less strongly on the Ni(111) plane than on the Ni(100) surface. Di hydrogen evolution formed after decomposition of benzene was similar for both surfaces. Benzene chemisorption was modeled by using extended Huckel theory (EHT), a semiempirical molecular orbital method. The calculations predict bonding of benzene over a three-fold hollow site on Ni(111). Multicenter bonding of the benzene carbon atoms with the nickel atoms is indicated by the calculations. The binding strength of benzene is controlled by the degree of overlap of the carbon orbitals with the nickel atom orbitals. Benzene binds more strongly to the Ni(100) surface because of the carbon pi orbitals can overlap with four nickel atoms on the fourfold hollow site, whereas on Ni(111) the carbon atoms are closely associated with only three nickel atoms on the threefold hollow site. Keywords: Nickel, Benzene, Extended Huckel theory, Molecular bonding.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 396 CONTINUED

DESCRIPTORS: (U) *ADSORPTION, *BENZENE, ATOMS, CARBON, CHEMISORPTION, DECOMPOSITION, INTERACTIONS, MOLECULAR ORBITALS, NICKEL, OVERLAP, STRENGTH(GENERAL), TEMPERATURE, SURFACE CHEMISTRY, ATOMIC ORBITALS, MOLECULAR STRUCTURE, CRYSTAL LATTICES, CHEMICAL REACTIONS, SYMMETRY(CRYSTALLOGRAPHY), SURFACES, REPRINTS.

IDENTIFIERS: (U) Atom atom interactions, PE61102F, WUAFOSR2303A2.

AD-A186 396

AD-A186 395 7/3

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Study of Poly(Bis(P-Toluene Sulfonate) Diacetylene) Films Prepared by a Modification of the Langmuir-Blodgett Technique,

85 11P

PERSONAL AUTHORS: McCaffrey, Robert R.; Prasad, Paras N.; Fornalik, Mark; Baier, Robert

CONTRACT NO. AFOSR-82-0118

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1265

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Polymer Science: Polymer Physics Edition, v23 p1523-1532 1985.

ABSTRACT: (U) Coherent thin films of poly(bis(p-toluene sulfonate) diacetylene) were successfully formed by modified Langmuir-Blodgett techniques using two methods: (i) photopolymerization of the monomer film at the gas/liquid interface and then transfer to a solid substrate, and (ii) transfer of the monomer film to the solid substrate and subsequent photopolymerization on the substrate itself. The films thus obtained were characterized by traditional force-area isotherms while on pure water subphases. Segments were transferred at either 1 or 10 dyn/cm surface pressure, in different stages of photopolymerization, to glass or germanium substrates. The films on the substrate were characterized by the methods of multiple attenuated-internal-reflection infrared spectroscopy, ellipsometry, contact-potential measurement, and laser Raman spectroscopy. Our results show that the films are multimolecular and about 100 A thick. Of special interest were the observation of significant anisotropy of oriented dipoles and the ability to obtain excellent spectral data for these very thin oriented films. Raman spectroscopic features are similar to those observed for the bulk polymer, even in the low-frequency region. Polarized Raman spectroscopy

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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confirmed the presence of local anisotropy in these films.

DESCRIPTORS: (U) *FILMS, *SULFONATES, *ACETYLENES, ANISOTROPY, COHERENCE, ELLIPSOMETERS, GASES, GERMANIUM, INTERFACES, LIGHT SCATTERING, LIQUIDS, LOW FREQUENCY, MONOMERS, PHOTOCHEMICAL REACTIONS, POLARIZATION, POLYMERIZATION, POLYMERS, PRESSURE, PURITY, RAMAN SPECTROSCOPY, SOLIDS, SPECTRA, SUBSTRATES, SURFACE PROPERTIES, THIN FILMS, WATER, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A186 388 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Control Charts When the Observations Are Correlated.

DESCRIPTIVE NOTE: Technical rept.,

MAY 87 14P

PERSONAL AUTHORS: Krishnaiah, P. R.; Miao, B. Q.

REPORT NO. TR-87-09

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1109

UNCLASSIFIED REPORT

ABSTRACT: (U) Traditionally, quality control charts have been designed with respect to statistical criteria only, and the control methodology is based on the independence and normality of serial samples. At first the production process is assumed to be characterized by a single in-control state. For example, if the process has one measurable quality characteristic, then the in-control state will correspond to the mean of this quality characteristic when no assignable cause is present. Keywords: Autoregressive models; Time series; Multivariate analysis.

DESCRIPTORS: (U) *CHARTS, *CORRELATION TECHNIQUES, MEASUREMENT, METHODOLOGY, MULTIVARIATE ANALYSIS, NORMALITY, QUALITY CONTROL, SAMPLING, SEQUENCES, STATISTICS, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) Autoregressive analysis, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 387 12/2 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Asymptotic Joint Distributions of the Eigenvalues of Random Matrices Which Arise under Components of Covariance Model.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 18P

PERSONAL AUTHORS: Bai, Z. D.; Krishnaiah, P. R.; Zhao, L. C.

REPORT NO. TR-87-16

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1076

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors derived asymptotic joint distributions of the eigenvalues of some random matrices which arise under components of covariance model. Keywords: Eigenstructure analysis; Multivariate analysis; Analysis of variance.

DESCRIPTORS: (U) *MATRIX THEORY, *PROBABILITY DISTRIBUTION FUNCTIONS, ASYMPTOTIC SERIES, COVARIANCE, EIGENVALUES, MULTIVARIATE ANALYSIS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 387

AD-A186 386 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Estimation of Multivariate Binary Density Using Orthonormal Functions.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 17P

PERSONAL AUTHORS: Chen, X. R.; Krishnaiah, P. R.; Liang, W. Q.

REPORT NO. TR-86-48

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1075

UNCLASSIFIED REPORT

ABSTRACT: (U) In a number of situations, the experimenter is confronted with the statistical analysis of the data which is binary in nature. For example, one may be interested in diagnosis of the disease on the basis of symptoms. The reliability of complicated systems can be studied by examining as to whether its components are functioning or not. In image processing, a picture is classified on the basis of two grey levels like white and black using some threshold value. We may assign a score of 1 or 0 according as the grey level is white or black respectively. So, it is important to study the problems of estimation of multivariate binary density. Cencov expressed continuous multivariate density as a series of orthonormal functions. Bahadur expressed the multivariate binary density as a series. Ott and Kronmal expressed the density as a series involving Walsh functions. Liang and Krishnaiah also expressed the density in terms of Walsh functions but the coefficients in their series are different from those used by Ott and Kronmal. This paper is a continuation of the work done by Liang and Krishnaiah.

DESCRIPTORS: (U) *DENSITY, *MULTIVARIATE ANALYSIS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 386 CONTINUED

*THRESHOLD EFFECTS, *WALSH FUNCTIONS, *ESTIMATES, COEFFICIENTS, DIAGNOSIS(GENERAL), DISEASES, IMAGE PROCESSING, RELIABILITY, SIGNS AND SYMPTOMS, STATISTICAL ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 385 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) The Information Metric for Univariate Linear Elliptic Models.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87

PERSONAL AUTHORS: Burbea, Jacob; Oller, Jose M.

REPORT NO. TR-87-20

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0978

UNCLASSIFIED REPORT

ABSTRACT: (U) THe concepts of metrics and distances are fundamental in problems of statistical inference and in practical applications to study affinities among a given set of populations. A statistical model is specified by a family of probability distributions, described by a set of continuous parameters known as the parameter space. This model possesses some geometrical properties which are induced by the local information structures of the distributions. In particular, the Fisher information matrix of the given family of distributions gives rise to a Riemannian metric over the parameter space, whose geodesic distance, known as the Rao distance, plays a major role in the multivariate statistical techniques. For the family of multivariate normal distributions with fixed shape but varying locations, this distance reduces the well-known Mahalanobis distance. This document refers to Burbea and Rao for more details on these concepts and their derivations. An interesting statistical model is provided by the family of elliptic distributions whose density functions have elliptical contours and which include the multivariate normal distributions as a subfamily. This paper studies the information metric associated with an elliptic family whose shape varies linearly.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 385 CONTINUED

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *STATISTICAL INFERENCE, *METRIC SYSTEM, CONTOURS, DENSITY, ELLIPSES, GEODESICS, GEOMETRY, LINEARITY, MULTIVARIATE ANALYSIS, NORMAL DISTRIBUTION, PROBABILITY DISTRIBUTION FUNCTIONS, RANGE(DISTANCE), SHAPE, STATISTICAL ANALYSIS, STATISTICAL PROCESSES, VARIATIONS, POPULATION(MATHEMATICS).

IDENTIFIERS: (U) *Univariate analysis, PE61102F, WUAFOSR2304A5.

AD-A186 384 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strong Consistency of Maximum Likelihood Parameter Estimation of Superimposed Exponential Signals in Noise.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 21P

PERSONAL AUTHORS: Bai, Z. D.; Chen, X. R.; Krishnaiah, P. R.; Wu, Y. H.; Zhao, L. C.

REPORT NO. TR-87-17

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0973

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider the model of multiple superimposed exponential signals in additive Gaussian noise yj(t) = (sigma i= 1 to p)sij (lambda sub i) to the t power + ej(t), t = 0,1,...,n-1, j = 1,...,N. Keywords include: Consistency, Exponential rate, Maximum likelihood estimate, Signal processing.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, *SIGNAL PROCESSING, ESTIMATES, PARAMETERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 366 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Fundamental Aspects of the Structure of Supersonic Turbulent Boundary.

DESCRIPTIVE NOTE: Annual rept. no.2, Apr 86-May 87,

MAY 87 41P

PERSONAL AUTHORS: Watmuff, Jonathan H.; Smits, Alexander J.

CONTRACT NO. AFOSR-85-0126

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1269

UNCLASSIFIED REPORT

ABSTRACT: (U) Measurements of structure angle in a supersonic turbulent boundary layer with zero and adverse pressure gradients are presented. Conditionally sampled measurements of u,v, and uv are presented along with quadrant analysis of the turbulent fluctuations. The latter suggests ambiguities associated with the interpretation of VITA measurements. Preliminary results of experiments on artificially generated hairpin vortices are also discussed. Measurements indicate a high degree of similarity between the signatures of these hairpin structures and ensemble averaged events in the turbulent boundary layer. Keywords: Turbulence, Boundary layer, Supersonic Flow.

DESCRIPTORS: (U) *SUPERSONIC FLOW, *TURBULENT BOUNDARY LAYER, *VORTICES, ADVERSE CONDITIONS, ANGLES, BOUNDARY LAYER, PRESSURE GRADIENTS, QUADRANTS, TURBULENCE, TURBULENT FLOW, VARIATIONS.

IDENTIFIERS: (U) Hairpin vortices, PE61102F, WUAFOSR2307A2.

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AD-A186 365 12/4

COLUMBIA UNIV NEW YORK

(U) On Stochastic Optimality of Policies in First Passage Problems.

DESCRIPTIVE NOTE: Technical rept.,

84 14P

PERSONAL AUTHORS: Katehakis, Michael N.; Melolidakis, Costis

CONTRACT NO. AFOSR-87-0072, $NSF-DMS84-05413

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1250

UNCLASSIFIED REPORT

ABSTRACT: (U) In stochastic scheduling and optimal maintenance problems that have been considered in the literature, the optimization criterion used has often been equivalent to minimizing the expected first passage times to a set of states. A typical method used in establishing the optimality of a certain policy is the method of successive approximations on the appropriate dynamic programming functional equations. As an intermediate result, this technique often involves the optimally of the pertinent policy for all finite horizon versions of the problem. This paper characterizes stochastically optimal policies as policies that process a similar property, i.e. these are optimal in expectation for all members of a sequence of appropriately defined finite horizon problems. The authors use this characterization to establish the stochastic optimality of relevent policies for the optimal repair allocation for a series system problem and for a scheduling problem.

DESCRIPTORS: (U) *OPTIMIZATION, *STOCHASTIC PROCESSES, APPROXIMATION(MATHEMATICS), DYNAMIC PROGRAMMING, EQUATIONS, FUNCTIONAL ANALYSIS, MAINTENANCE, POLICIES, REPAIR, SCHEDULING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 365

AD-A186 364 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) A Modified Kernel Quantile Estimator under Censoring.

DESCRIPTIVE NOTE: Technical rept.,

MAR 87 18P

PERSONAL AUTHORS: Lio, Y. L.; Padgett, W. J.

REPORT NO. TR-125

CONTRACT NO. AFOSR-84-0156, $MIPR-ARO-139-85

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1247

UNCLASSIFIED REPORT

ABSTRACT: (U) Based on right censored data from a lifetime distribution F sub 0, a modification of the kernel quantile estimator is proposed. The advantage of this estimator is that the data play a role in the degree of smoothing of the estimator while retaining the desireable features of the kernel estimator. Convergence in probability and almost sure convergence of the estimator are discussed. Some examples are given which illustrate the differences between this modified estimator and the fixed-bandwidth kernel quantile estimator for randomly right-censored data. Keywords: Random censoring; Product-limit quantile function; Kernel type quantile estimator; Nonparametric quantile estimation.

DESCRIPTORS: (U) *KERNEL FUNCTIONS, *NONPARAMETRIC STATISTICS, CONVERGENCE, ESTIMATES, MODIFICATION.

IDENTIFIERS: (U) Quantile estimators, *Censored data, PE61102F, WUAFOSR2304A5.

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AD-A186 361 19/9 13/3 8/10

COLORADO UNIV AT BOULDER DEPT OF CIVIL ENVIRONMENTAL AND ARCHITECTURAL ENGINEE RING

(U) Centrifugal and Numerical Modeling of Buried Structures. Volume 3. A Centrifuge Study of the Behavior of Buried Conduits Under Airblast Loads.

DESCRIPTIVE NOTE: Final rept.,

JUL 87

PERSONAL AUTHORS: Whittaker, James P.

CONTRACT NO. AFOSR-84-0300

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-87-1448

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A185 590.

ABSTRACT: (U) The principle object of the research was to provide a better understanding of the behavior of the soil-structure interaction phenomena associated with buried conduits subjected to airblast loads. A parametric study was performed to experimentally determine the effects of airblast loads on 4-in diameter micro-concrete pipes, embedded horizontally in a dry sand. The parameters varied in the study included the gravity level, the applied airblast pressure level, the relative density of the dry sand, burial depth of the structure, and the relative stiffness between the structure and the soil. A geotechnical centrifuge was used to create the proper in-situ stress conditions in the sample during each test. Dynamic stress gages were utilized to measure the applied airblast on the sample surface, the normal stresses acting at the soil-pipe interface, and in the free-field conditions. Proximitors positioned inside of the structures were used to measure the resulting deflections. The results of the experimental study verified the importance of testing models at increased gravity levels, and determined the feasibility of the dynamic stress gages for measurement of contact and free-field stresses.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 361 CONTINUED

Interesting trends in contact stresses around the circumference of the pipe; variations of 20 percent in relative density of the sand produced no significant changes in contact stress levels.

DESCRIPTORS: (U) *CONDUITS, *BLAST LOADS, AIRBORNE, AIRBURST, BLAST, BURIED OBJECTS, CENTRIFUGAL FIELDS, CENTRIFUGES, DEFLECTION, DENSITY, DEPTH, DRY MATERIALS, DYNAMICS, FREE FIELD, GAGES, GRAVITY, INTERACTIONS, MATHEMATICAL MODELS, MEASUREMENT, PARAMETRIC ANALYSIS, PRESSURE, RATES, SAND, SOILS, STIFFNESS, STRESSES, STRUCTURES, UNDERGROUND STRUCTURES, PIPES, INTERFACES, STRESS ANALYSIS, IMPULSE LOADING, STRUCTURAL RESPONSE, MODEL TESTS.

IDENTIFIERS: (U) Stress gages, *Soil structure interactions, Micro-concrete pipes, Geotechnical centrifuges, Contact stresses, WUAFOSR2302C1, PE61102F.

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AD-A186 360 19/9 13/13 8/10

COLORADO UNIV AT BOULDER DEPT OF CIVIL ENVIRONMENTAL AND ARCHITECTURAL ENGINEE RING

(U) Centrifugal and Numerical Modeling of Buried Structures. Volume 2. Dynamic Soil-Structure Interaction.

DESCRIPTIVE NOTE: Final rept.,

JUL 87

PERSONAL AUTHORS: Shin, Charng-Jeng

CONTRACT NO. AFOSR-84-0300

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-87-1446

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A186 361.

ABSTRACT: (U) Soil-Structure interaction under blast loading was investigated both experimentally in 10 g-ton centrifuge and analytically by finite element simulation. In the centrifuge experiments, circular pipes made of micro-concrete were buried in a dry sand and tested in the centrifuge to simulate the effects of gravity-induced overburden stresses which played a major role in controlling the soil stiffness and, subsequently, the response of the pipe. The blast loading was simulated by a pressure pulse generated by rupturing a burst disc in an impact generator. Surface stress gages and contact stress gages both made of polyvinylidene fluoride were built and calibrated to measure air blast magnitudes and contact pressures. The centrifuge experiments provided insight into the dynamic response of buried pipes and a data base for the verification of numerical results. These results were obtained by linear and non-linear finite element analyses of the experiments duplicating the surface overpressure loading. The suitability of constitutive relations for both soil and micro-concrete were verified by comparing test results and analysis. The effects of soil arching around the buried pipe was also

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delineated from both experiment and analysis.

DESCRIPTORS: (U) *BLAST LOADS, *PIPES, *SOILS, *UNDERGROUND STRUCTURES, BURIED OBJECTS, CENTRIFUGAL FIELDS, CENTRIFUGES, CIRCULAR, DATA BASES, DRY MATERIALS, DYNAMIC RESPONSE, DYNAMICS, FINITE ELEMENT ANALYSIS, GAGES, GENERATORS, IMPACT, INTERACTIONS, LOADS(FORCES), MATHEMATICAL MODELS, NUMERICAL ANALYSIS, OVERPRESSURE, PRESSURE, PULSES, RESPONSE, SAND, SIMULATION, STIFFNESS, STRESSES, STRUCTURES, SURFACES, TEST METHODS, AIRBORNE, STRESS ANALYSIS, IMPULSE LOADING, STRUCTURAL RESPONSE, MODEL TESTS, SIMULATORS, INTERFACES.

IDENTIFIERS: (U) *Soil structure interactions, Micro-concrete pipes, Stress gages, Constitutive relations, Blast load simulators, Geotechnical centrifuges, contact stresses, WUAFOSR2302C1, PE61102F.

AD-A186 359 22/1

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) Maximum Entropy/Optimal Projection Design Synthesis for Decentralized Control of Large Space Structures.

DESCRIPTIVE NOTE: Annual rept. Oct 86-Apr 87,

MAY 87 233P

PERSONAL AUTHORS: Hyland, David C.; Bernstein, Dennis S.

CONTRACT NO. F49620-86-C-0038

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-87-1196

UNCLASSIFIED REPORT

ABSTRACT: (U) The maximum Entropy/Optical Projection (MEOP) methodology is a novel approach to designing implementable vibration-suppression controllers for large space systems. Two issues, in particular, have been addressed, namely, controller order (i.e. complexity) and systems robustness (i.e., insensitivity to plant variations). Extensions developed herein include generalizations to decentralized controller architectures and a new robustness analysis technique known as Majorant Robustness Analysis.

DESCRIPTORS: (U) *CONTROL, *SPACECRAFT, *ATTITUDE CONTROL SYSTEMS, ARCHITECTURE, DECENTRALIZATION, ENTROPY, OPTICAL PROPERTIES, SPACE SYSTEMS, MATRICES(MATHEMATICS), RICCATE EQUATION.

IDENTIFIERS: (U) Robust procedures, Large space structures, PE61102F, WUAFOSR2302B1.

AD-A186 358 7/3

NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF CHEMISTRY

(U) Self-Reaction of Pentamethyldisilyl Radicals Is Dimethylsilylene a Product?,

87 6P

PERSONAL AUTHORS: Hawari, J. A.; Griller, D.; Weber, W. P. ; Gaspar, P. P.

CONTRACT NO. AFOSR-86-0042

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1359

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v326 p335-339 1987.

ABSTRACT: (U) The self-reaction of the pentamethyldisilyl radical was investigated, in solution, at 298 K. Products due to the disproportionation and combination of these radicals were detected in a ratio < or = 0.48. However, there was no evidence for silylene formation. These results suggest that silylenes, which are formed during polysilane photolysis, are not produced from the self-reaction of polysilyl radicals but must be photo-extruded from the polysilane itself.

DESCRIPTORS: (U) *POLYSILANES, DISPROPORTIONATION, PHOTOLYSIS, RATIOS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A186 358

AD-A186 357 7/4

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Optical Studies of Product State Distributions in Thermal Energy Ion-Molecule Reactions,

87 34P

PERSONAL AUTHORS: Bierbaum, Veronica M.; Leone, Stephen R.

CONTRACT NO. AFOSR-86-0018

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-0993

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Structure/Reactivity and *Thermochemistry of Ions*, p23-25 1987.

ABSTRACT: (U) Product state distributions of thermal energy ion-molecule reactions are determined by the sensitive optical methods of infrared chemiluminescence and laser-induced fluorescence detection. Experiments to obtain detailed vibrational state populations are carried out in a flowing afterglow ion source. Product state information is obtained for a series of proton transfer reactions and charge transfer reactions, which reveals many aspects of the dynamical behaviors of these processes. Measurements are also presented for polyatomic ion-molecule reactions, for optically-determined rates of ion collisional excitation and deactivation, and on visible chemiluminescence yields and branching fractions for reactions important in the aurora. Keywords: Aurora; Flowing afterglow; Infrared chemiluminescence; Ion molecule reactions; Laser; Product states.

DESCRIPTORS: (U) *CHARGE TRANSFER, *ION ION INTERACTIONS, *MOLECULES, *OPTICAL PROPERTIES, BEHAVIOR, CHEMICAL REACTIONS, CHEMILUMINESCENCE, COLLISIONS, DEACTIVATION, DETECTION, DISTRIBUTION, DYNAMICS, EXCITATION, INFRARED RADIATION, IONS, LASER INDUCED FLUORESCENCE, LASERS, OPTICS, POLYATOMIC MOLECULES, POPULATION, PROTON REACTIONS, SENSITIVITY, THERMAL RADIATION, TRANSFER, VIBRATION, VISIBLE SPECTRA, YIELD.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 357 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303131.

AD-A186 356 12/2

CALIFORNIA UNIV SANTA BARBARA

(U) Construction of Orthonormal Bases in Higher Symmetry Classes of Tensors.

86 9P

PERSONAL AUTHORS: Marcus, Marvin; Chollet, John

CONTRACT NO. AFOSR-83-0150

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1025

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear and Multilinear Algebra, v19 p133-140 1986.

ABSTRACT: (U) The authors present a method for constructing an orthonormal basis for a symmetry class of tensors from an orthonormal basis of the underlying vector space. The basis so obtained is not composed of decomposable symmetrized tensors. Indeed, we show that, for symmetry classes of tensors whose associated character has degree higher than one, it is impossible to construct an orthogonal basis of decomposable symmetrized tensors from any basis of the underlying vector space. We end with an open problem on the possibility of a symmetry class having an orthonormal basis of decomposable symmetrized tensors. (Reprints).

DESCRIPTORS: (U) *TENSORS, REPRINTS, SYMMETRY, VECTOR SPACES, ORTHOGONALITY.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 355 20/4

TEL-AVIV UNIV (ISRAEL) SCHOOL OF ENGINEERING

(U) On the Pairing Process in an Excited, Plane, Turbulent Mixing Layer.

DESCRIPTIVE NOTE: Final Technical rept. 15 Aug 85-15 Aug 86,

AUG 87 16P

PERSONAL AUTHORS: Wygnanski, I.; Weisbrot, I.

CONTRACT NO. AFOSR-84-0333

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1165

UNCLASSIFIED REPORT

ABSTRACT: (U) The flowfield of a plane, turbulent mixing layer disturbed by a small oscillating flap was investigated. Three experiments were carried out: one in which the flap oscillated sinusoidally at a single frequency, a second in which the flap oscillation at two frequencies, a fundamental and a subharmonic; and a third in which the amplitude of the subharmonic perturbation was increased until a distortion in the mean flow was detected. Two velocity components were measured at all phase angels intervals. The data were used to map vorticity fields and the streak-line patterns for the purpose of assessing the relevance of the latter to the understanding of the dynamical processes involved. Keywords: Vortex pairing. (Israel)

DESCRIPTORS: (U) *FLAPS(CONTROL SURFACES), *TURBULENT FLOW, DISTORTION, DYNAMICS, VORTICES, FLOW FIELDS, HARMONICS, ISRAEL, LAYERS, MEAN, MIXING, OSCILLATION, PERTURBATIONS, TURBULENT FLOW.

IDENTIFIERS: (U) Vortex pairing, *mixing layers, turbulent mixing layers, PE61102F, WUAFOSR2307A2.

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AD-A186 354 6/4

PRINCETON UNIV NJ

(U) Bioreactivity: Regulation of Neuronal Responsiveness--Role of Locus.

DESCRIPTIVE NOTE: Final technical rept. 20 Nov 84-19 May 87,

JUL 87 8P

PERSONAL AUTHORS: Jacobs, Barry L.

CONTRACT NO. AFOSR-85-0034

PROJECT NO. 2312

TASK NO. K2

MONITOR: AFOSR TR-87-1154

UNCLASSIFIED REPORT

ABSTRACT: (U) In mammals, a group of neurons localized in an area of the brainstem called the locus coeruleus utilize norepinephrine as their neurotransmitter and are believed to be important in attention, vigilance, anxiety, and arousal. Studies supported by this grant over the past 2 1/2 years explored these issues by means of chronic single unit recordings in unrestrained and unanesthetized cats. The work has been highly productive and has resulted in a number of major findings, most or which have been published or will be published within the next six months. We have completed a detailed analysis of the response of locus coeruleus-noradrenergic (LC-NE) neurons to repetitive presentation of simple sensory stimuli and how this response is altered by systemic administration of anxiolytic and anxiogenic drugs. We have also finished a study which examined the activity of these neurons during appetitive and aversive conditioning. In our most comprehensive investigations in the series of environmental and physiological challenges (stressors). Overall, our experiments indicate an important role for this system in vigilance and bioreactivity. especially in situations that can be regarded as challenging or successful to the organism.

DESCRIPTORS: (U) *STIMULI, *NERVE TRANSMISSION,

AD-A186 354

AD-A186 354 CONTINUED

*RESPONSE(BIOLOGY), ANXIETY, CATS, DRUGS, LEVARTERENOL, LOCUS, MAMMALS, NERVE CELLS, RECORDING SYSTEMS, SENSES(PHYSIOLOGY), VIGILANCE, NEUROCHEMISTRY, STIMULATION(PHYSIOLOGY), ATTENTION, STRESS(PHYSIOLOGY).

IDENTIFIERS: (U) *Locus coeruleus, Norepinephrine, PE61102F, WUAFOSR2312K2.

AD-A186 353 9/3

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Two-Dimensional Imaging Measurements in Supersonic Flows Using Laser-Induced Fluorescence of Oxygen,

JUN 87 8P

PERSONAL AUTHORS: Cohen, L. M.; Lee, M. P.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-0986

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the AIAA Thermophysics Conference (22nd), Honolulu, HI, 8-10 Jun 87.

ABSTRACT: (U) Planar laser induced fluorescence of molecular oxygen in a supersonic jet of heated air is reported. A tunable, narrow-bandwidth ArF excimer laser was used to excite a rovibronic transition of oxygen in the Schumann-Runge band system at 193 nm. A comparison between the predicted pressure and temperature profiles obtained in the underexpanded round jet with the fluorescence image data is presented. Keywords: Laser, Fluorescence, Imaging, Oxygen, Supersonic Flow, Excimer

DESCRIPTORS: (U) *IMAGES, *LASER INDUCED FLUORESCENCE, *LASERS, *OXYGEN, ABSORPTION, ABSORPTION COEFFICIENTS, ABSORPTION SPECTRA, ARGON LASERS, COMBUSTION, FLOW, FLUORESCENCE, FLUORIDES, INTEGRATED SYSTEMS, MEASUREMENT, OXYGEN, SPECTRA, STRENGTH(GENERAL), SUPERSONIC FLOW, TEMPERATURE, TWO DIMENSIONAL, YIELD, AIR, EXCIMERS, FLUORESCENCE, HEAT, IMAGES, LASER INDUCED FLUORESCENCE, LASERS, MEASUREMENT, MOLECULAR PROPERTIES, PLANAR STRUCTURES, PROFILES, SUPERSONIC AIRCRAFT, SUPERSONIC FLOW, TEMPERATURE, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 352 12/3

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Mathematical Techniques for System Realization and Identification.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 85-31 Mar 87,

JUL 87 6P

PERSONAL AUTHORS: Kalman, R. E.

CONTRACT NO. AFOSR-85-0186

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1330

UNCLASSIFIED REPORT

ABSTRACT: (U) PUBLICATIONS SPONSORED BY THIS GRANT WERE: Structures of finite semigroups and generalization; The synthesis theorem for finite regular semigroups, and its generalization; A realization theoretic solution of two analytic matrix equations with application to stabilization of infinite dimensional systems, H infinity solutions of Bezout type equations and stabilization of a class of infinite dimensional systems; The problem of prejudice in scientific modeling; and Non-Euclidian metrics and the robust stabilization of systems with parameter uncertainty.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, EQUATIONS, MODELS, SOLUTIONS(GENERAL), SYNTHESIS, THEOREMS, THEORY.

IDENTIFIERS: (U) Semigrops(mathematics), PE61102F, WUAFOSR2304A1.

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CALIFORNIA UNIV LOS ANGELES

(U) Measurement and Modification of Sensorimotor System Function during Visual-Motor Performance.

DESCRIPTIVE NOTE: Final rept. 30 Sep 82-29 Jun 87,

AUG 87 17P

PERSONAL AUTHORS: Sterman, M. B.; Schummer, G. J.; Oushenko, T. W.; Smith, J. C.

CONTRACT NO. AFOSR-82-0335

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-87-1366

UNCLASSIFIED REPORT

ABSTRACT: (U) Both laboratory and in-flight studies were carried out in order to evaluate the utility and feasibility of EEg monitoring as a means of identifying central nervous system correlates of performance and G-force effects during military flight operations. Four studies were conducted, two with controlled laboratory simulation, and two in actual flight during military training missions. Data analysis focused on EEG power-spectral density characteristics and their temporal modulation, specifically in sensorimotor and visual cortical areas. Several consistent findings emerged. During competent performance, a highly unique discrepency appeared between left and right hemispheres in central 8-15 Hz activity. This pattern disappeared as performance degraded. The temporal modulation of this activity also reflected these changes. During high G-force situations, power at frequencies below 8 Hz was progressively and non-specifically enhanced. Continued competent performance, however, was still reflected by the pattern described above. These findings are discussed in terms of their neurophysiological implications.

DESCRIPTORS: (U) *ELECTROENCEPHALOGRAPHY, *CEREBRAL CORTEX, *VISION, *MOTOR REACTIONS, CENTRAL NERVOUS SYSTEM, CONTROL, DATA PROCESSING, FEASIBILITY STUDIES, FLIGHT,

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HEMISPHERES, INFLIGHT, LABORATORY PROCEDURES, MILITARY AIRCRAFT, MILITARY OPERATIONS, MILITARY TRAINING, MISSIONS, MONITORING, ACCELERATION TOLERANCE, PERFORMANCE(HUMAN), CONSCIOUSNESS, FATIGUE(PHYSIOLOGY), CIRCADIAN RHYTHMS, SLEEP, MAN MACHINE SYSTEMS, FLIGHT SIMULATION, VIGILANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A186 350 12/4

BOEING COMPUTER SERVICES CO TUKWILA WA ENERGY TECHNOLOGY APPLICATIONS DIV

(U) Ordering Methods for Sparse Matrices and Vector Computers.

DESCRIPTIVE NOTE: Final rept. no. 2, 16 Apr 85-15 Aug 86,

AUG 86 11P

PERSONAL AUTHORS: Simon, Horst D.

CONTRACT NO. F49620-85-C-0057

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-0967

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the activities at Boeing Computer Service Company from April 15, 1985 until August 15, 1986. Five tasks are defined in our analysis of quotient tree algorithms and frontal methods: analysis of multifrontal methods, creation of symmetric indefinite out - of-core minimal storage elimination schemes, analyses of quotient tree orderings, and completion of the Boeing-Harwell sparse matrix collection. (Keywords: linear equations; reordering algorithms; Choleski factorization; vector computers; parallel computers.

DESCRIPTORS: (U) *SPARSE MATRIX, *HEURISTIC METHODS, ALGORITHMS, ELIMINATION, LINEAR ALGEBRAIC EQUATIONS, PARALLEL ORIENTATION, STORAGE, VECTOR ANALYSIS.

IDENTIFIERS: (U) Vector computers, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 348 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) Some Convergence Results for Kernel-Type Quantile Estimators under Censoring,

JAN 87 11P

PERSONAL AUTHORS: Lio, Y. L.; Padgett, W. J.

CONTRACT NO. AFOSR-84-0156

MONITOR: AFOSR TR-87-1282

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Statistics and Probability Letters, v5 n1 p5-14 Jan 87.

ABSTRACT: (U) Based on right-censored data from a lifetime distribution, some important asymptotic properties of kernel-type estimators of the quantile function are presented, including asymptotic normality and mean-square convergence (with a rate). Keywords: smooth nonparametric quantile estimation; random censorship; probability distribution functions; theorems; reprints.

DESCRIPTORS: (U) *CONVERGENCE, *PROBABILITY DISTRIBUTION FUNCTIONS, ASYMPTOTIC NORMALITY, CENSORSHIP, REPRINTS, MEAN, KERNEL FUNCTIONS.

IDENTIFIERS: (U) Quantile functions.

AD-A186 348

AD-A186 347 7/3

DARTMOUTH COLL HANOVER N H DEPT OF CHEMISTRY

(U) Pentamethylcyclopentadienyl Cobalt and Rhodium Complexes of Octafluorocyclooctatetraene. Photochemical and Thermal Interconversion of 1,2,5,6-eta- and 1,2,3,6-eta-C8F8 Isomers. Electrochemical and ESR Characterization of the 19-Electron Radical Anion (Co(eta-C5Me5)(1,2,5,6-eta-C8F8)),

87

PERSONAL AUTHORS: Carl, Richard T.; Doig, Stephen J.; Geiger, William E.; Hemond, Richard C.; Hughes, Russell P.

CONTRACT NO. AFOSR-86-0075, $NSF-CHE83-08974

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1302

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v6 n3 p611-616 1987.

ABSTRACT: (U) Thermal reaction of a hexane solution of octafluorocyclootatetraene (OFOCT) with either Co(Cp*)(CO)2 or Rh(Cp*)(C2H4)(Cp* = eta-Cf5Me5) in the dark afforded good yields of the complexes M(eta-C5Me5)-(1,2,5,6,-eta-C8F8) (11a, M = Co; 11b, M= Rh). Photolysis of solutions of 11a, b at different temperatures afforded a photostationary 2.3:1.0 mixture of the starting complexes and the isometric compounds M(eta-CMe5)(1,2,3,6-eta-C8F8) (12a, M = CO; 12b, M = Rh). The ration of isomers is independent of M and the photolysis temperature. Heating each mixture in the dark results in quantitative conversion to pure isomer 11. One-electron reduction of 11a results in an ECE mechanism. The first electron-transfer step produces the radical anion 11a-, in which the mode of ligation of OFCOT to cobalt is maintained and in which ESR studies show the half-filled orbital to be located primarily on the metal. Subsequent reaction of this radical anion occurs to give an electrochemically active product that was too unstable to characterize. Keywords: Fluorine compounds, Cyclic compounds.

AD-A186 347

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 347 CONTINUED

DESCRIPTORS: (U) *CYCLIC COMPOUNDS, *FLUORINE COMPOUNDS, *PHOTOLYSIS, *RHODIUM, COBALT, CONVERSION, DARKNESS, HEAT, HEXANES, ISOMERS, REPRINTS, DARKNESS, HEAT, HEXANES, ISOMERS, RATIONS, REACTION KINETICS, SOLUTIONS(GENERAL), STARTING, TEMPERATURE, REPRINTS.

IDENTIFIERS: (U) Tetraene/octafluorocyclo, PE&;102F, WUAFOS2303B2.

AD-A186 344 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Probabilistic Approach to Computational Algorithms for Finding Stationary Distributions of Markov Chains.

DESCRIPTIVE NOTE: Technical rept.,

OCT 86 11P

PERSONAL AUTHORS: Taksar, Michael I.; Grassmann, Winfried K.

REPORT NO. FSU-STATISTICS-M751

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1044

UNCLASSIFIED REPORT

ABSTRACT: (U) A number of important theorems arising in connection with Gaussian elimination are derived, using semi-regenerative analysis. The implications of these theorems to find steady-state solutions of Markov chains are analysed. The results obtained in this way are then applied to quasi birth-death processes. Keywords: computations; algorithms; equalibrium equations.

DESCRIPTORS: (U) *MARKOV PROCESSES, ALGORITHMS, BIRTH, COMPUTATIONS, DEATH, DISTRIBUTION, EQUATIONS, PROBABILITY, SOLUTIONS(GENERAL), STATIONARY, STEADY STATE, EQUILIBRIUM(GENERAL).

IDENTIFIERS: (U) ZMarkov Chains, Birth Death Processes.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 343 23/3

NORTHWESTERN UNIV EVANSTON IL CRESAP NEUROSCIENCE LAB

(U) Cooperative Phenomena in the Perception of Motion Direction,

MAY 87 9P

PERSONAL AUTHORS: Williams, Douglas; Phillips, Gregory

CONTRACT NO. AFOSR-80-0246

MONITOR: AFOSR TR-87-1280

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Optical Society of America, v4 n5 p878-885 May 87.

ABSTRACT: (U) A percept of global coherent motion can result from the combination of many different localized motion vectors. We report evidence of hysteresis in the perception of this global motion, obtained with random-dot cinematograms. The hysteresis characteristics are relatively robust with respect to changes in dot density, display area, and location. Changing the directional content of the stimulus, however, did alter the hysteresis profile in a manner consistent with a model incorporating cooperative interactions among direction-selective motion mechanisms. Our results lend further support to a cooperative interpretation of motion perception in random-dot cinematograms. Keywords: visual perception. (Reprints)

DESCRIPTORS: (U) *MOTION, *VISUAL PERCEPTION, COHERENCE, GLOBAL, HYSTERESIS, INTERACTIONS, CINEMATOGRAPHY, REPRINTS.

IDENTIFIERS: (U) Cinematograms.

AD-A186 343

AD-A186 342 7/3

DARTMOUTH COLL HANOVER N H DEPT OF CHEMISTRY

(U) Transition-Metal-Promoted Ring-Opening Reactions of Vinylcyclopropenes. 1,2,3,5-Eta-Penta-2,4-dienediyl and 1,5-Eta-Penta-2,4-dienediyl (1-Metallacyclohexa-2, 4-diene) Complexes of Rhodium(III) and Iridium(III) and Their Conversion to (Eta5-Cyclopentadienyl) Hydridometal Compounds,

87 5P

PERSONAL AUTHORS: Egan, James W., Jr.; Hughes, Russell P. ; Rheingold, Arnold L.

CONTRACT NO. AFOSR-86-0075

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1303

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v6 n7 p1578-1581 1987.

ABSTRACT: (U) 1, 2, 3-Triphenyl-3-vinyl-1-cyclopropene (2) reacts with MCl (PMe3)2 (M = Rh, Ir) to give novel complexes 3a, b containing the 1, 2, 3, 5-n-penta-2, 4-dienediyl ligand, one of which, the iridium species 3b, has been crystallographically characterized. In contrast, reaction of 2 with the bulkier reagent RhCl (P-i-Pr3)2 yields directly the (cyclopentadienyl) hydridorhodium complex 6. Reaction of 3z with (acetylacetonato) thallium affords the (1,5-n-penta-2, 4-dienediyl) rhodium (1-rhodacyclohexa-2, 4-diene) complex 8 which has also been crystallographically characterized.

DESCRIPTORS: (U) *PROPENES, RHODIUM, THALLIUM, REPRINTS.

IDENTIFIERS: (U) *Propenes/Vinyl cyclo, PE61102F, WUAFOSR2303B2.

AD-A186 342

DTIC REPORT BIBLIOGRAPHY

AD-A186 341 7/4

OHIO STATE UNIV COLUMBUS DEPT OF PHYSICS

(U) Symposium on Molecular Spectroscopy (42nd) Held in Columbus, Ohio on June 15-19, 1987.

DESCRIPTIVE NOTE: Interim rept.,

JUN 87 224P

PERSONAL AUTHORS: Rao, K. N.

CONTRACT NO. AFOSR-86-0065

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-87-1266

UNCLASSIFIED REPORT

ABSTRACT: (U) The 42nd Symposium on Molecular Spectroscopy was convened at Ohio State University during the period 15-19 June 1987. Over 300 scientists attended, representing research organizations from the U.S. and fourteen foreign countries. Topical areas included electronic characteristics of molecules, energy transfer, infrared and microwave spectra, liquid and solid state phenomena, laser spectra, Raman spectra, molecular beams, vibrational analysis, and experimental techniques. As planned, special emphasis was placed on the spcectroscopy of van der Waals molecules, and there was a special session on probing and modeling the earth's atmosphere.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *SYMPOSIA, ELECTRONICS, ENERGY TRANSFER, EXPERIMENTAL DESIGN, FOREIGN, LASERS, METHODOLOGY, MICROWAVES, MOLECULAR BEAMS, MOLECULES, NATIONS, OHIO, RAMAN SPECTRA, SCIENTIFIC ORGANIZATIONS, SOLID STATE PHYSICS, SPECTRA, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

AD-A186 341

SEARCH CONTROL NO. EVJ50D

AD-A186 338 12/4

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTE MS ANALYSIS

(U) An Improved Implementation of Conditional Monte Carlo Estimation of Path Lengths in Stochastic Networks,

DEC 85 6P

PERSONAL AUTHORS: Kulkarni, V. G.; Provan, J. S.

REPORT NO. UNC/ORSA/TR-84/7

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1065

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Operations Research, v33 n6 p1389-1393 Nov-Dec 85.

ABSTRACT: (U) This document suggests an improvement to the Monte Carlo simulation techniques of Sigal, Pritsker and Solberg for estimating the distribution of the shortest-longest path length in a stochastic network. This improvement also applies in network reliability estimation and PERT analysis. Keywords: Arcs; Uniformly directed cuts.

DESCRIPTORS: (U) *MONTE CARLO METHOD, ESTIMATES, LENGTH, METHODOLOGY, NETWORKS, PATHS, PERT, RELIABILITY, SIMULATION, STOCHASTIC PROCESSES, MODIFICATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 338

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 337 12/4

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTE MS ANALYSIS

(U) Bounds on the Reliability of Networks,

AUG 86 10P

PERSONAL AUTHORS: Provan, J. S.

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1071

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in *IEEE Transactions on* Reliability, vR-35 n3 Aug 86.

ABSTRACT: (U) This paper presents criteria for acceptable schemes to approximate system reliability and investigates such schemes for a special class of network reliability problems. In this framework, we are able to use powerful combinatorial theory to obtain strong bounds for network reliability which can be computed by efficient algorithms. We demonstrate these bounds on a small example, and give some computational experience. Keywords: Reprints; Polynomials; Theorems.

DESCRIPTORS: (U) , ALGORITHMS, COMBINATORIAL ANALYSIS, EFFICIENCY, POLYNOMIALS, REPRINTS, THEORY, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 337

AD-A186 336 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Bonding in 1,3-Cyclodisiloxanes: 29Si NMR Coupling Constants in Disilenes and 1,3-Cyclodisiloxanes,

87 4P

PERSONAL AUTHORS: Yokelson, Howard B.; Millevolte, Anthony J.; Adams, Bruce R.; West, Robert

CONTRACT NO. F49620-86-C-0010, $NSF-CHE83-18820

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1295

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in. Jnl. of the American Chemical Society, v109 p4116-4118 1987.

ABSTRACT: (U) The coupling constants J(Si-Si) for a series of unsymmetrically substituted tetraaryldisilenes (2-4) and 1,3-cyclodisiloxanes (7-9) each containing two chemically and magnetically nonequivalent silicon atoms, were measured by 29 Si NMR spectroscopy. The disiloxanes were generated by oxidation of the corresponding disilenes in benzene solution at 25 C. Values for J(Si-Si) are discussed as they related to the unique structural and bonding features in these two systems.

DESCRIPTORS: (U) *SILANES, *CYCLIC COMPOUNDS, ATOMS, BENZENE, CONSTANTS, COUPLING(INTERACTION), OXIDATION, SILICON, SOLUTIONS(GENERAL), SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303132.

AD-A186 336

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 335 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Parameter Estimation for the Dirichlet-Multinomial Distribution Using Supplementary Beta-Binomial Data.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 13P

PERSONAL AUTHORS: Danaher, Peter J.

REPORT NO. FSU-STATISTICS-M761

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1084

UNCLASSIFIED REPORT

ABSTRACT: (U) The author develops estimates for the parameters of Dirichlet-multinomial distribution (DMD) when there is insufficient data to obtain maximum likelihood or method of moment estimates known in the literature. We do, however, have supplementary beta-binomial data pertaining to the marginals of the DMD, and use these data when estimating the DMD parameters. A real situation and data set are given where the estimates are applicable. Keywords: Asymptotic properties.

DESCRIPTORS: (U) *ESTIMATES, *PARAMETRIC ANALYSIS, ASYMPTOTIC SERIES, MAXIMUM LIKELIHOOD ESTIMATION, METHOD OF MOMENTS.

IDENTIFIERS: (U) Multinomial distribution, PE61102F, WUAFOSR2304A5.

AD-A186 335

AD-A186 334 12/1

MARYLAND UNIV BALTIMORE COUNTY CATONSVILLE DEPT OF MATHEMATICS

(U) The p-Version of the Finite Element Method for Elliptic Equations of Order 21.

DESCRIPTIVE NOTE: Summary rept.

JUL 87 42P

CONTRACT NO. AFOSR-85-0322

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1053

UNCLASSIFIED REPORT

ABSTRACT: (U) The finite element method has three versions: the h-version, the p-version and the h-p version. In the h-version, increased accuracy is achieved by decreasing the mesh size h while keeping p, the degree of elements used fixed (usually p = 1,2,3). Int he p-version, a fixed mesh is used while the degree p of elements are either uniformly or selectively increased to achieve accuracy. The h-p version is a combination of both. The standard h-version has been thoroughly investigated and many commercial and research programs are available. The p- and h-p versions are recent developments. There is only one commercial code, the system PROBE, and the first papers discussing theoretical aspects appeared only in 1981. The approximations of solutions of elliptic problems of order 21 over two - dimensional polygonal domains by the p-version of the finite element is investigated. Optimal rates of convergence are established for the case when elements possessing C continuity are used.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, CONTINUITY, CONVERGENCE, ELLIPSES, EQUATIONS, OPTIMIZATION, POLYGONS, RATES, MESH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A186 334

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 320 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Estimation and Comparison of Changes in the Presence of Information Right Censoring by Modeling the Censoring Process.

DESCRIPTIVE NOTE: Technical rept. Aug 86-Aug 87,

MAR 87 30P

PERSONAL AUTHORS: Wu, Margaret C.; Carroll, Raymond J.

REPORT NO. MMS-1718

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1073

UNCLASSIFIED REPORT

ABSTRACT: (U) In estimating and comparing the rates of change of a continuous variable between two groups, the unweighted averages of individual simple least squares estimates from each group are often used. Under a linear random effects model, when all individuals have completed observations at identical time points these statistics are maximum likelihood estimates for the expected rates of change. However, with censored of missing data, these estimates are no longer efficient when compared to generalized least squares estimates. When, in addition, the right censoring process is dependent upon the individual rates of change (i.e., informative right censoring), the generalized least squares estimates will be biased. Likelihood ratio test for informativeness of the censoring process and maximum likelihood estimates for the expected rates of change and the parameters of the right censoring process are developed under a linear random effect models with a probit model for the right censoring process. In realistic situations, we illustrate that the bias in estimating group rate of change and the reduction of power in comparing group difference could be substantial when strong dependency of the right censoring process on individual rates of change is ignored. (Author)

AD-A186 320

AD-A186 320 CONTINUED

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *MAXIMUM LIKELIHOOD ESTIMATION, COMPARISON, ESTIMATES, LEAST SQUARES METHOD, LINEAR SYSTEMS, LINEARITY, RANDOM VARIABLES, RATIOS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY

AD-A186 319 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Conditionally Unbiased Bounded Influence Robust Regression with Applications to Generalized Linear Models.

DESCRIPTIVE NOTE: Technical rept. Aug 86-Aug 87,

MAR 87 18P

PERSONAL AUTHORS: Kunsch, H. R.; Stefanski, L. A.; Carroll, R. J.

REPORT NO. MMS-1717

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1107

UNCLASSIFIED REPORT

ABSTRACT: (U) This document proposes a class of bounded influence robust regression estimators with conditionally unbiased estimating functions given the design. Optimal estimators are found within this class. Applications are made to generalized linear models. An example applying logistic regression to food stamp data is discussed. Keywords: Asymptotic bias; Generalized linear models; Linear regression.

DESCRIPTORS: (U) *ESTIMATES, *LINEAR REGRESSION ANALYSIS, LINEARITY, LOGISTICS, MATHEMATICAL MODELS, BIAS, FOOD STAMPS, VASOCONSTRICTING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

SEARCH CONTROL NO. EVJ50D

AD-A186 318 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) A Note on Extended Quasi-Likelihood.

DESCRIPTIVE NOTE: Technical rept. Aug 86-Aug 87,

FEB 87 17P

PERSONAL AUTHORS: Davidian, Marie; Caroll, R. J.

REPORT NO. MMS-1716

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1132

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors study the method of extended quasi-likelihood estimation of the variance function. This method is shown to be closely related to the method of psuedo-likelihood estimation as in Carroll & Ruppert (1982). Keywords: Asymptotic normality; Statistical inference; Heteroscedastic regression model.

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *ESTIMATES, ASYMPTOTIC NORMALITY, STATISTICAL INFERENCE, VARIATIONS, VARIATIONS, REGRESSION ANALYSIS, MATHEMATICAL MODELS, ASYMPTOTIC NORMALITY.

IDENTIFIERS: (U) Quasi likelihood estimation, PE61102F, WUAFSOR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 317 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Estimation and Testing in Truncated and Nontruncated Linear Median-Regression Models.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 41P

PERSONAL AUTHORS: Chen, X. R.; Krishnaiah, P. R.

REPORT NO. TR-86-50

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1089

UNCLASSIFIED REPORT

ABSTRACT: (U) A number of important recent advances in econometric theory are related to the methods of truncated regression model - the regression model in which the range of the dependent variable is restricted to some interval of (-infinity, infinity), usually the non-negative half-line, such as the income of an individual. Powell used the L sub 1-norm criterion with some modifications in estimating the regression coefficients in truncated linear models. He proved the consistency and asymptotic normality of his estimates under a set of conditions. On the other hand, Nawata's paper uses the ordinary L sub 2-norm (least square) criterion, along with a grouping and adjustment of the observed data. In his view, his method has the merit of easy computation compared with the method of Powell. This paper borrows the basic idea of Nawata in grouping and adjusting the observed data. But the authors make simplifications in the procedure of grouping, which enables us to make substantial extensions of the results of Nawata's paper under weakened conditions. Keywords: Linear median regression; Truncated regression; Parameters; Linearity.

DESCRIPTORS: (U) *ECONOMETRICS, *MATHEMATICAL MODELS,

AD-A186 317 CONTINUED

*LINEAR REGRESSION ANALYSIS, ASYMPTOTIC NORMALITY, COEFFICIENTS, INCOME, LEAST SQUARES METHOD, LINEARITY, THEORY, TRUNCATION, ESTIMATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 316 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Extreme Points of the Set of All 2xn Bivariate Positive Quadrant Dependent Distributions with Fixed Marginals and Some Applications.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 25P

PERSONAL AUTHORS: Subramanyam, K.; Bhaskara Rao, M.

REPORT NO. TR-87-13

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1118

UNCLASSIFIED REPORT

ABSTRACT: (U) The set of all bivariate distributions with support contained in ((i.j); i = 1,2 and j = 1,2..., n) which are positive quadrant dependent is a convex set. In the paper, an algebraic method is presented for the enumeration of all extreme points of this convex set. Certain measures of dependence, including Kendall's tau, are shown to be affine functions on this convex set. This property of being affine helps us to evaluate the asymptotic power of tests based on these measures of dependence for testing the hypothesis of independence against strict positive quadrant dependence. Keywords: Multivariate analysis; Asymptotic; Random variables; Probability distribution functions.

DESCRIPTORS: (U) *BIVARIATE ANALYSIS, *CONVEX SETS, *PROBABILITY DISTRIBUTION FUNCTIONS, ALGEBRA, DISTRIBUTION, HYPOTHESES, MULTIVARIATE ANALYSIS, QUADRANTS, RANDOM VARIABLES, ASYMPTOTIC NORMALITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A186 316

AD-A186 315 12/2

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) The K-Grid Fourier Analysis of Multigrid-Type Iterative Methods.

DESCRIPTIVE NOTE: Final rept.,

JUL 87 65P

PERSONAL AUTHORS: Decker, Naomi H.

REPORT NO. TR-703

CONTRACT NO. AFOSR-82-0275, $AFOSR-86-0163

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1268

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments indicate that a multigrid-type cycle can be used as an efficient preconditioner in the iterative solution of the discrete problem corresponding to a singularly perturbed elliptic boundary value problem. Motivated by a report of Goldstein, we explore the theoretical basis for the efficiency of such a preconditioner when applied to a model problem. The techniques developed are also used to analyze a multigrid V-cycle when used alone as a fast iterative solver. (Author)

DESCRIPTORS: (U) *ITERATIONS, *BOUNDARY VALUE PROBLEMS, *FOURIER ANALYSIS, SOLUTIONS(GENERAL), GRIDS(COORDINATES), POISSON EQUATION, CONVERGENCE.

IDENTIFIERS: (U) Jacobi functions, Dirichlet problem, PE61102F, WUAFOSR2304A3.

AD-A186 315

AD-A186 312 12/5 12/1

YALE UNIV NEW HAVEN CONN

(U) Local Uniform Mesh Refinement for Partial Differential Equations.

DESCRIPTIVE NOTE: Final rept.,

JUL 87 4P

PERSONAL AUTHORS: Gropp, William

CONTRACT NO. AFOSR-84-0360

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1267

UNCLASSIFIED REPORT

ABSTRACT: (U) Several aspects of adaptive methods for partial differential equations implemented on vector and parallel computers were investigated on this effort. A new techniques for mapping mesh points to processors in a static way has been developed, this takes advantage of the structure of the family of solutions without singling out any one solution. Three publications and two technical reports resulted from this effort, as well as two conference proceedings papers and four presentations. Papers included such titles as A comparison of domain decomposition techniques for elliptic partial differential equations and their parallel implementation, Local uniform mesh refinement on loosely-complied parallel processors, and Dynamic grid manipulation for partial differential equations on hypercube parallel processors. (Author)

DESCRIPTORS: (U) *PARALLEL PROCESSORS, *PARTIAL DIFFERENTIAL EQUATIONS, *ADAPTIVE SYSTEMS, DECOMPOSITION, MESH, SYMPOSIA.

IDENTIFIERS: (U) LUMR(Local Uniform Mesh Refinement), PE61102F, WUAFOSR2304A3.

AD-A186 312

AD-A186 300 12/5

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Parallel Logic Programming and ZMOB and Parallel Systems Software and Hardware.

DESCRIPTIVE NOTE: Final rept.,

DEC 86 17P

PERSONAL AUTHORS: Minker, Jack; Weiser, Mark

CONTRACT NO. AFOSR-82-0303

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-87-1271

UNCLASSIFIED REPORT

ABSTRACT: (U) Under the current grant parallel hardware and systems software implemented on ZMOB in the previous year underwent extensive testing. A parallel problem solving system, PRISM (Parallel Inference System) implemented on the VAX/11-780 in the previous year was implemented on the PYRAMID and SUN machines. The initial version of PRISM uses a simulation of the ZMOB hardware, and has been fully tested and debugged. Experimental testing of PRISM on the simulated system was undertaken in the current year. In addition, several enhancements were made to PRISM to permit experimental analyses to be made, and to incorporate additional features to take full advantage of parallelism in a problem solving environment. The tracing and statistical gathering packages were extended. An AND-parallelism capability was added to achieve a second version of the PRISM system, and other features were added to the system to more fully exploit parallelism. A constraint solving machine was integrated with PRISM. In addition to the above, a general method to permit informative answers to be presented to a user has been developed. Theoretical results were obtained for circumscription and a method for computing in protected circumscription, using Horn clauses was developed. In the area of systems hardware and software, the ZMOB processor is now fully functional and in everyday use with 128 processors.

AD-A186 300

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 300 CONTINUED

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, COMPUTER PROGRAMS, LOGIC, PARALLEL ORIENTATION, PARALLEL PROCESSING, PROBLEM SOLVING, COMPUTERIZED SIMULATION.

IDENTIFIERS: (U) PRISM(Parallel Inference System).

AD-A186 299 12/3

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) On a New Graphical Method of Determining the Connectedness in Three Dimensional Design.

DESCRIPTIVE NOTE: Interim rept.,

DEC 85 16P

PERSONAL AUTHORS: Ghosh, Subir

REPORT NO. TR-138

CONTRACT NO. AFOSR-86-0043

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1284

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper studies the connectedness of 3 dimensional designs by reducing the dimension of designs from three to two. A new graphical method of determining the connectedness of designs is presented. The method is easier and simpler than the earlier known methods of Birkes, Dodge and Seely (1976) and Srivastava and Anderson (1970). A generalization of this method for 4 or higher dimensional designs is also discussed.

DESCRIPTORS: (U) *GRAPHS, *FACTORIAL DESIGN, THREE DIMENSIONAL, SIZES(DIMENSIONS), CONTRAST, RANDOM VARIABLES, REDUCTION.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 298 12/2

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Stationary Regenerative Sets and Subordinators.

DESCRIPTIVE NOTE: Technical rept.,

NOV 86 19P

PERSONAL AUTHORS: Fitzsimmons, P. J.; Taksar, Michael

REPORT NO. FSU-TR-M752

CONTRACT NO. F49[illegible]-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1043

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper gives a simple construction of the general stationary regenerative set, based on the stationary version of the associated subordinator (increasing Levy process). It is shown that, in a certain sense, the closed range of such a Levy process is a stationary regenerative subset of R. The distribution of this regenerative set is delta-finite in general; it is finite if the increments of the Levy process have finite expectation.

DESCRIPTORS: (U) *SET THEORY, CONSTRUCTION, STATIONARY, MARKOV PROCESSES.

IDENTIFIERS: (U) Levy processes, Regenerative sets, WUAFOSR2304A5, PE61102F.

AD-A186 298

AD-A186 295 10/2

RASOR ASSOCIATES INC SUNNYVALE CA

(U) Close-Spaced High Temperature Knudsen Flow.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 83-15 May 86,

JUL 86

PERSONAL AUTHORS: McVey, John B.

REPORT NO. NSR-22-4

CONTRACT NO. F49620-83-C-0068

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-87-1255

UNCLASSIFIED REPORT

ABSTRACT: (U) This work studied discharge processes in Knudsen mode (collisionless), thermionic energy converters. Mechanisms for reducing the effects of electron space charge in such devices are essential for thermionic converters to produce useful current and power densities. The mechanisms studied are: reduction of space-charge through a very close interelectrode gap (less than 10 microns); transport and retention of positive cesium ions generated by surface ionization; transport of positive cesium ions generated in an arc external to the electrodes; and the mechanism for enhanced current output due to a structured emitter in a mixed barium-cesium vapor. The experimental work used SAVTEC (Self-Adjusting, Versatile Thermionic Energy Converter) diode structures which were tested in a chamber containing 0.1 - 1.0 torr of cesium vapor. Comparison of measured volt-ampere curves with theory gave excellent agreement and indicated an interelectrode gap of 6.5 microns at an emitter temperature of 1250 K. A theoretical model of the collisionless thermionic diode was developed which included surface ionization, auxiliary ions from an external source, and trapping of charged particles in potential wells due to infrequent collisions. Studies showed that trapping of positive ions leads to a large,

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beneficial increase in current density. Using a diffusion analysis to couple this model to models of collision-dominated discharges gave predictions of the performance of SAVTEC devices in the presence of an auxiliary discharge, and led to design criteria for electrode size in order for auxiliary ionization to be effective.

DESCRIPTORS: (U) *THERMIONIC CONVERTERS, AUXILIAPY, CATIONS, CESIUM, CURRENT DENSITY, DENSITY, DIODES, ELECTRODES, ELECTRONS, EMITTERS, ENERGY CONVERSION, EXTERNAL, IONIZATION, IONS, KNUDSEN NUMBER, MODELS, OUTPUT, POWER, REDUCTION, SIZES(DIMENSIONS), SOURCES, SPACE CHARGE, STRUCTURES, SURFACE PROPERTIES, TEMPERATURE, THEORY, TRAPPING(CHARGED PARTICLES), VAPORS, METAL VAPORS, BARIUM, HIGH TEMPERATURE, TRANSPORT.

IDENTIFIERS: (U) , Knudsen flow, SAVTEC(Self Adjusting Versatile Thermionic Energy Converter), Collisions thermionic diodes, Thermonic diodes, WUAFOSR2308A1, PE61102F.

AD-A186 294 12/3

CALIFORNIA UNIV DAVIS INTERCOLLEGE DIV OF STATISTICS

(U) Reliability Modeling and Inference for Coherent Systems Subject to Aging, Shock and Repair.

DESCRIPTIVE NOTE: Annual rept.,

JUL 84 4P

PERSONAL AUTHORS: Samaniego, F. J.

CONTRACT NO. AFOSR-84-0159

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1258

UNCLASSIFIED REPORT

ABSTRACT: (U) Efforts during this period were largely devoted to the study of three specific problems: (1) The estimation of the lifetime distribution of a system subject to imperfect repair; (2) the estimation of a life distribution known to belong to the class of distribution for which new is better than used in expectation; and (3) Multivariate modeling of the joint distribution of component lifetimes for systems under repair. Results are discussed below. Results have been obtained on two additional problems: Parametric modeling and inference for random records and general modeling of the multivariate lack of memory property.

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, *STATISTICAL INFERENCE, COHERENCE, DISTRIBUTION, MODELS, MULTIVARIATE ANALYSIS, PARAMETRIC ANALYSIS, RELIABILITY, REPAIR, SYSTEMS ANALYSIS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) *Life distributions.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 293 12/4

COLUMBIA UNIV NEW YORK

(U) On Stochastic Optimality of Policies in First Passage Problems.

DESCRIPTIVE NOTE: Journal rept.,

87 15P

PERSONAL AUTHORS: Katehakis, Michael N.; Melolidakis, Costis

CONTRACT NO. AFOSR-87-0072, $NSFDMS-84-05413

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1254

UNCLASSIFIED REPORT

ABSTRACT: (U) In stochastic scheduling and optimal maintenance problems that have been considered in the literature, the optimization criterion used has often been equivalent to minimizing the expected first passage times to a set of states. A typical method used in establishing the optimality of a certain policy is the method of successive approximations on the appropriate dynamic programming functional equations. As an intermediate result, this technique often involves, the optimality of the pertinent policy for all finite horizon versions of the problem. This paper characterizes stochastically optimal policies as policies that process a similar property, i e. they are optimal in expectation for all members of a sequence of appropriately defined finite horizon problems. The authors use this characterization to establish the stochastic optimality of relevant policies for the optimal repair allocation for a series system problem and for a scheduling problem. (Author)

DESCRIPTORS: (U) *OPTIMIZATION, *POLICIES, APPROXIMATION(MATHEMATICS), DYNAMIC PROGRAMMING, EQUATIONS, FUNCTIONAL ANALYSIS, MAINTENANCE, REPAIR, SCHEDULING, STOCHASTIC PROCESSES, INEQUALITIES, PROBLEM SOLVING.

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IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 292 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Recursive M-Estimators of Location and Scale for Dependent Sequences,

NOV 86 21P

PERSONAL AUTHORS: Englund, Jan-Eric; Holst, Ulla; Ruppert, David

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1251

UNCLASSIFIED REPORT

ABSTRACT: (U) Recursive M-estimators of location and scale may be obtained via stochastic approximation algorithms. We consider the case when the observations can be described by a strictly stationary process satisfying certain strong mixing conditions and results on strong convergence are given. The asymptotic distributions of the estimators for sequences of independent observations are also discussed.

DESCRIPTORS: (U) *ESTIMATES, *STATISTICAL DISTRIBUTIONS, ALGORITHMS, APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, STATIONARY, STOCHASTIC PROCESSES, SEQUENCES(MATHEMATICS), CONVERGENCE.

IDENTIFIERS: (U) Strong convergence, WUAFOSR2304A5, PE61102F.

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AD-A186 276 7/4 21/2 20/4

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

(U) Carbon Monoxide and Turbulence-Chemistry Interactions: Blowoff and Extinction of Turbulent Diffusion Flames.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 86-1 May 87,

MAY 87 77P

PERSONAL AUTHORS: Correa, S. M.; Gulati, A.

CONTRACT NO. F49620-85-C-0035

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1162

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this program is to understand turbulence chemistry interactions in combustion up to and including localized extinction. Experimentally, pilot stabilized non premixed turbulent jet flames of selected mixtures are being studied under conditions conducive to strain-induced local extinction. Laser based techniques such as Raman scattering and Rayleigh scattering are employed. Analytically, models based on the asymptotically thin flamelet concept and on distributed reaction zone concepts are being assessed. A significant finding is that the popular contemporary view of a turbulent flame as an ensemble of asymptotically thin flamelets seems incorrect. Alternative mechanisms based on thick flamelets are proposed. The results include: (1) A complete re evaluation of Raman data showing significant corrections due to high temperature effects. Keywords: Turbulence chemistry interactions, Extinction, Blowoff, turbulent diffusion flames, Superequilibrium, Laser diagnostics.

DESCRIPTORS: (U) *CARBON MONOXIDE, *TURBULENCE, BLOWOFF, COMBUSTION, DIAGNOSIS(GENERAL), DIFFUSION, DISTRIBUTION, EXTINCTION, HIGH TEMPERATURE, LASERS, LIGHT SCATTERING, RAYLEIGH SCATTERING, ASYMPTOTIC NORMALITY, MONTE CARLO METHOD, HYDROGEN, NITROGEN, REACTION KINETICS, FUELS,

AD-A186 276

AD-A186 276 CONTINUED

RAMAN SPECTROSCOPY.

IDENTIFIERS: (U) Jet flames, Diffusion flames, Flamelets, WUAFOSR2308A2, PE61102F.

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AD-A186 273 25/5 12/5

ARIZONA UNIV TUCSON

(U) Saguaro: A Distributed Operating System Based on Pools of Servers.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 84-31 Dec 86,

MAR 86 5P

PERSONAL AUTHORS: Andrews, Gregory R.

CONTRACT NO. AFOSR-84-0072

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-87-1246

UNCLASSIFIED REPORT

ABSTRACT: (U) In the past year we have implemented prototypes of components of the Saguaro distributed operating system and refined the design of the entire system based on the experience. The philosophy behind Saguaro is to support the illusion of a single virtual machine while taking advantage of the concurrency and robustness that are possible in a network architecture. Within the system, these advantages are realized by the use of pools of server processes and decentralized allocation protocols. Potential concurrency and robustness are also made available to the user through low-cost mechanisms to control placement of executing commands and files, and to support semi-transparent file replication and access. Another unique aspect of Saguaro is its extensive use of type system to describe user data such as files and to specify the types of arguments to commands and procedures. This enables the system to assist in type checking and leads to a user interface in which command-specific templates are available to facilitate command invocation. A mechanism, channels, is also provided to enable users to construct applications containing general graphs of communication processes Keywords: SR distributed programming language.

DESCRIPTORS: (U) *ARCHITECTURE, *COMMUNICATION AND RADIO SYSTEMS, *CONTROL, *DECENTRALIZATION, *INTERFACES,

AD-A186 273

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 273 CONTINUED

*NETWORKS, ALLOCATIONS, EMPLACEMENT, GRAPHS, LOW COSTS, PROTOTYPES, USER NEEDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A186 270 12/3

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) On Two Methods of Identifying Influential Sets of Observations.

DESCRIPTIVE NOTE: Interim rept. Dec 86-Feb 87,

FEB 87 13P

PERSONAL AUTHORS: Ghosh, Subir

REPORT NO. TR-152

CONTRACT NO. AFOSR-87-0048

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1244

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper two new measurements are proposed to identify influential sets of observations at the design state in view of prediction and fitting. A relationship is established between one of proposed measures and the Cook's measure at the inference stage. (Keywords: Statistical models; robustness; linear models)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, LINEARITY, MEASUREMENT, STATISTICAL ANALYSIS, EXPERIMENTAL DESIGN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 269 17/11 12/5 12/3

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Research in Programming Languages and Software Engineering.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 85,

DEC 85 4P

PERSONAL AUTHORS: Gannon, John; Basili, Victor; Zelkowitz, Marvin; Yeh, Raymond

CONTRACT NO. F49620-85-K-0008

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-87-1243

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past year three research papers were written and two published conference presentations were given. Titles of the published research articles are: A Stochastic Analysis of a Modified Gain Extended Kalman Filter with Applications to Estimation with Bearings only Measurements; The Modified Gain Extended Kalman Kilter and Parameter Identification in Linear Systems and Maximum Information Guidance for Homing Missiles.

DESCRIPTORS: (U) *BEARINGS, *COMPUTER PROGRAMS, *ESTIMATES, *GUIDANCE, *KALMAN FILTERING, *LINEAR SYSTEMS, *STOCHASTIC PROCESSES, GAIN, IDENTIFICATION, MEASUREMENT, PROGRAMMING LANGUAGES, SYSTEMS ENGINEERING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A186 268 12/6

COLORADO UNIV AT BOULDER

(U) Computational Support for Diverse Research Projects.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 85,

JUN 86 9P

PERSONAL AUTHORS: Kassoy, D. R.

CONTRACT NO. AFOSR-85-0090

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1226

UNCLASSIFIED REPORT

ABSTRACT: (U) A description is given of computer and peripheral equipment purchased. Specific items and prices are included. Brief summaries of six research projects that have benefitted from extensive use of the purchased computer system are given. Keywords: Winchester drives transceiver; Matrix printers; Graphics/terminals; Modems; Software manuals; Hardware, Wire and cables; and Manual covers and binders.

DESCRIPTORS: (U) *DATA PROCESSING EQUIPMENT, BINDERS, COMPUTATIONS, COMPUTER PROGRAMS, DRIVES, MANUALS, MATRIX DISPLAYS, MODEMS, PRINTERS(DATA PROCESSING), TRANSMITTER RECEIVERS, WIRE, COMPUTER GRAPHICS, DATA PROCESSING TERMINALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 267 12/5 9/1 12/6

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

(U) A Proposal to the DoD-University Research Instrumentation Program.

DESCRIPTIVE NOTE: Final rept. 1 Aug 83-31 Jul 84,

DEC 85 8P

PERSONAL AUTHORS: Browne, J. C.

CONTRACT NO. AFOSR-83-0315

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1225

UNCLASSIFIED REPORT

ABSTRACT: (U) This report lists the equipment purchased with the funds provided under Grant Number AFOSR-83-0315 and describes the use which has been made of the equipment in support of Department of Defense sponsored and other research projects. The funds provided by the grant were combined with matching funds from the University of Texas to create an environment for experimental research in parallel computer design and development environment and a software development environment. The hardware design and development environment includes capabilities for the design and validation of chips and printed circuit boards. The software development environment includes a software-rich superminicomputer and a set of low-power graphics workstations. The hardware which was purchased includes a Digital Equipment Corporation VAX 11/750 computer system, Tekronix high speed digital logic analyzer, a Valid Logic Corporation workstation with the Scald design package and several Apple Macintoshes to be used as terminals and low-power workstations. A portion of the funds in the AFOSR grant was used to purchase printed circuit boards to complete the four-processor nine-memory unit configuration of the Texas Reconfigurable Array Computer (TRAC).

DESCRIPTORS: (U) *ARRAYS, *CHIPS(ELECTRONICS), *COMPUTER

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PROGRAMS, *PARALLEL PROCESSORS, *PRINTED CIRCUIT BOARDS, COMPUTERS, LOGIC, MATCHING, MONEY, PROCUREMENT, STATIONS, TEXAS, VALIDATION, WORK.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 266 12/5

ARIZONA UNIV TUCSON DEPT OF COMPUTER SCIENCE

(U) Saguaro: A Distributed Operating System Based on Pools of Servers.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 85,

FEB 86 8P

PERSONAL AUTHORS: Andrews, Gregory R.

CONTRACT NO. AFOSR-85-0089

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-87-1224

UNCLASSIFIED REPORT

ABSTRACT: (U) There are four projects underway that either have used the equipment purchased using the finds from this grant or will use the equipment in the near future. Titles and abstracts of the representative papers describing these projects follow. It is the first project the Saguaro Distributed Operating System that formed the basis for the URIP grant proposal.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, COMPUTER ARCHITECTURE, CONFIGURATIONS.

IDENTIFIERS: (U) *Operating systems(Computers), PE61102F, WUAFOSR2304A2.

AD-A186 266

AD-A186 265 20/4 12/1

UNIVERSITIES SPACE RESEARCH ASSOCIATION COLUMBIA MD

(U) Spectral Methods: Analysis and Applications to Flow Problems.

DESCRIPTIVE NOTE: Final scientific rept.,

DEC 86 8P

PERSONAL AUTHORS: Gottlieb, David

CONTRACT NO. AFOSR-83-0089

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1223

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, we have shown that we can characterize methods for the solution of incompressible flow problems as belonging to either parabolic or elliptic type with regard to the determination of pressure field. The elliptic schemes typically have smaller errors in the divergence field, with the errors decaying exponentially away from the boundaries of the computational domain. On the other hand, the parabolic schemes have smooth solutions, without numerical boundary layers, but care should be exercised with respect to the boundary conditions in order that initial divergence errors be eliminated. This analysis explains why elliptic schemes, like that introduced by Harlow Welch (1965) have been found to be more accurate than parabolic schemes.

DESCRIPTORS: (U) *BOUNDARY LAYER, *INCOMPRESSIBLE FLOW, BOUNDARIES, COMPUTATIONS, DETERMINATION, ELLIPSES, ERRORS, FLOW, NUMERICAL ANALYSIS, PARABOLAS, PRESSURE, SOLUTIONS(GENERAL), SPECTRUM ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS, COMPRESSIBLE FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A186 265

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 264 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTE MS ANALYSIS

(U) How Errors in Component Reliability Affect System Reliability.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 31P

PERSONAL AUTHORS: Fishman, George S.

REPORT NO. UNC/ORSA/TR-87/3

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0994

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper studies how sampling variation in component reliability estimates affects the computation of system reliability that uses these estimates as input. Results show that relative bias in system reliability grows quadratically with the number of components for which each component reliability estimate is used whereas the corresponding coefficient of variation grows linearly with this number of components. If these components are in parallel they lead to an understatement of system reliability. In series, they lead to an overstatement. The paper describes resampling schemes that eliminate bias without increasing the dominant variance term. (Keywords: operations research; systems analysis; statistical accuracy).

DESCRIPTORS: (U) *VARIATIONS, *STATISTICAL SAMPLES, *ERROR ANALYSIS, ACCURACY, BIAS, COEFFICIENTS, COMPUTATIONS, ESTIMATES, OPERATIONS RESEARCH, RELIABILITY, SAMPLING, STATISTICAL ANALYSIS, SYSTEMS ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 264

AD-A186 254 20/4

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Analysis of Three-Dimensional Viscous Internal Flows.

DESCRIPTIVE NOTE: Final rept. Jul 85-Sep 86,

MAR 87

PERSONAL AUTHORS: Ghia, Kirti N.; Ghia, Urmila

REPORT NO. UC-ASE-87-6-71

CONTRACT NO. AFOSR-85-0231

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-87-1215

UNCLASSIFIED REPORT

ABSTRACT: (U) A fifteen-month multi-tasked research project was pursued by the present investigators to study complex viscous flows under AFOSR sponsorship between July 1985 and September 1986. The major objective of this study was to require improved understanding of viscous flows and to develop basic computational methods for efficient determination of 2-D/3-D subsonic and incompressible flows. Two major analyses were pursued. These include the Interacting Parabolized Navier-Stokes (IPNS) analysis for steady flows and the full Navier-Stokes (NS) analysis for direct simulation of unsteady flows. The IPNS analysis developed employs no ad hoc artificial dissipation and, in spite of being a density-based formulation, performs well even for very low Mach numbers. The applications considered include 2-D cascades and channels of simple geometry. Keywords: Viscous Flows, Flow separation, Unsteady flows, Interacting equations, Multi Block structured grids, Three dimensional flows.

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, *UNSTEADY FLOW, *VISCOUS FLOW, DETERMINATION, DISSIPATION, EFFICIENCY, EQUATIONS, GRIDS, INTERACTIONS, MACH NUMBER, NUMERICAL METHODS AND PROCEDURES, SIMULATION, STEADY FLOW, FLOW SEPARATION, THREE DIMENSIONAL FLOW, SUBSONIC FLOW,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 254 CONTINUED

INCOMPRESSIBLE FLOW, CASCADES(FLUID DYNAMICS), GRIDS(COORDINATES).

IDENTIFIERS: (U) Parabolic differential equations, PE61102F, WUAFOSR07A4.

AD-A186 251 12/6

FLORIDA UNIV GAINESVILLE

(U) Image Processing Language Development.

DESCRIPTIVE NOTE: Final rept. Dec 86-Jan 87,

JUL 87

PERSONAL AUTHORS: Ritter, Gerhard X.

CONTRACT NO. AFOSR-86-0258

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-0966

UNCLASSIFIED REPORT

ABSTRACT: (U) This University Research Instrumentation Program (URIP) grant was used to purchased Sun 3 workstations to enhance the development of image processing facilities at the University of Florida. Several image processing research projects have made use of this equipment including the following topic: (1) image processing language development, (2) target distance measurement, (3) image complexity measures and their use in selection of optimum edge detection algorithms, and (4) global dataflow analysis optimization for image processing programs.

DESCRIPTORS: (U) *IMAGE PROCESSING, *IMAGES, *PROCESSING EQUIPMENT, ALGORITHMS, DETECTION, EDGES, FACILITIES, FLORIDA, INSTRUMENTATION, LANGUAGE, MEASUREMENT, OPTIMIZATION, RANGE(DISTANCE), TARGETS, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

IAC NO. GC-880123

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)IMAGE PROCESSING, IMAGES, ALGORITHMS, DETECTION, TARGETS, RANGE(DISTANCE), MEASUREMENT, OPTIMIZATION, EDGES, INSTRUMENTS.;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 250 20/4

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) Supersonic Flow Past Circular Cones at High Angles of Yaw, Downstream of Separation,

85 6P

PERSONAL AUTHORS: Holt, Maurice; Aghazadeh, Mostafa

CONTRACT NO. AFOSR-83-0199

MONITOR: AFOSR
TR-87-1364

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Conference on Numerical Methods in Fluid Dynamics (9th) New York, NY 1985.

ABSTRACT: (U) The calculation of viscous supersonic flow over circular cones at high angles of yaw has been partially carried out. The flow field was calculated as the interaction between the outer inviscid flow and an inner corrical boundary layer flow. The latter was treated by the orthonormal version of the Method of Integral Relations (M.I.R.) and continued up to the cross flow separation line. This work deals with the boundary layer downstream of this separation line where the circumferential velocity component, w, is reversed. The orthonormal version of M.I.R. needs to be modified in this region to take account of a minimum point in w near the cone surface. In contrast to two dimensional flow, this can be achieved by using polynomials to represent the normal gradient of w as a function of w, and square root factors, which seriously complicate the use of orthonormal M.I.R., are not needed. The extended calculation enables us to calculate the complete flow field over yawed supersonic cones, at different Mach numbers and yaw angles, including that in the far leeward region. (Reprints).

DESCRIPTORS: (U) *FLOW SEPARATION, *SUPERSONIC FLOW, ANGLES, BOUNDARY LAYER, CIRCULAR, COMPUTATIONS, CONICAL BODIES, CROSS FLOW, EXTERNAL, FLOW FIELDS, GRADIENTS, HIGH ANGLES, INVISCID FLOW, MACH NUMBER, POLYNOMIALS, REPRINTS, SUPERSONIC CHARACTERISTICS, SURFACES, TWO DIMENSIONAL FLOW, VISCOUS FLOW, YAW, NUMERICAL METHODS

AD-A186 250

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AND PROCEDURES.

IDENTIFIERS: (U) Method of integral relations.

AD-A186 250

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 243 12/1

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) Multilevel Continuation Techniques for Nonlinear Boundary Value Problems with Parameter Dependence.

DESCRIPTIVE NOTE: Journal article,

86 19P

PERSONAL AUTHORS: Mittelmann, H. D.

CONTRACT NO. AFOSR-84-0315

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1114

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Mathematics and Computation, v19 p265-282 1986.

ABSTRACT: (U) A new technique is described to continue along solution branches of parameter-dependent nonlinear boundary value problems in order to obtain accurate multigrid solutions at specified points. In particular, the implementation for a general class of second order equations in divergence form in the program PLTMG is described and analyzed. This method has proven to be very robust and efficient, as is illustrated by several examples.(Reprints)

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *COMPUTER APPLICATIONS, NONLINEAR SYSTEMS, GRIDS(COORDINATES), REPRINTS, TABLES(DATA), COMPUTATIONS.

IDENTIFIERS: (U) PLTMG computer program, PE61102F, WUAFOR2304A3.

AD-A186 242 6/4

TENNESSEE UNIV CENTER FOR THE HEALTH SCIENCES MEMPHIS

(U) Activity of Monkey Primary Somatosensory Cortical Neurons Changes Prior to Active Movement,

87 8P

PERSONAL AUTHORS: Nelson, R. J.

CONTRACT NO. AFOSR-85-0217

MONITOR: AFOSR
TR-87-1273

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research, v406 p 402-407 1987.

ABSTRACT: (U) Changes in the discharge rates of monkey primary somatosensory cortical neurons were recorded during the performance of wrist flexion and extension. Neurons with activity changes that occurred early before movement onset were often found in areas 3a, 1 and 2, but rarely in area 3b. Based on timing considerations, these observations suggest that somatosensory cortical neurons receive central as well as peripheral inputs that modulate their activity and that may be related to changes in tactile threshold before movement. Nerve transmission, Neurochemistry; Senses(Physiology); Contractions; Reprints.

DESCRIPTORS: (U) *NERVE CELLS, *NERVE TRANSMISSION, *THRESHOLDS(PHYSIOLOGY), *SENSES(PHYSIOLOGY), *MOTOR REACTIONS, PHYSIOLOGY, RATES, REPRINTS, THRESHOLD EFFECTS, TOUCH, WRIST.

IDENTIFIERS: (U) *Flexion, *Extension.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 241 20/11

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) A Free Boundary Problem and Stability for the Nonlinear Beam.

DESCRIPTIVE NOTE: Journal article,

86 18P

PERSONAL AUTHORS: Miersemann, Erich; Mittelmann, Hans D.

CONTRACT NO. AFOSR-84-0315

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1116

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Methods in the Applied Sciences, v8 p516-532 1986.

ABSTRACT: (U) The stability bound for the classical nonlinear Euler beam is determined in the case that its deflection is limited by an obstacle parallel to the plane of the beam. Let a clamped or simply supported beam be axially compressed by a force P > P sub 0, where P sub 0 denotes the critical load. So far only a linear theory has been applied to analyze the stability of the solutions in contact with the obstacle and the jumping to a different state. Utilizing a free boundary problem formulation we analytically as well as numerically answer these questions for the nonlinear beam. Keywords: Structural beam deflections; Bifurcation(Mathematics). (Reprints)

DESCRIPTORS: (U) *DEFLECTION, *STRUCTURAL RESPONSE, *BEAMS(STRUCTURAL), BOUNDARY VALUE PROBLEMS, FORMULATIONS, LINEARITY, NONLINEAR SYSTEMS, SOLUTIONS(GENERAL), STABILITY, THEORY, REPRINTS, SHEAR PROPERTIES.

IDENTIFIERS: (U) Bifurcation(Mathematics), PE61102F, WUAFOSR2304A3.

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AD-A186 240 20/4

GENERAL ELECTRIC CO LTD WEMBLEY (ENGLAND) CENTRAL LABS

(U) Calculation of Flow in a Supersonic Compression Corner by the Dorodnitsyn Finite Element Method.

JUN 86 8P

PERSONAL AUTHORS: Holt, Maurice; Pace, Christopher

CONTRACT NO. AFOSR-83-0199

MONITOR: AFOSR
TR-87-1363

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Numerical Methods in Fluid Dynamics (10th) p314-319, 23-27 Jun 86.

ABSTRACT: (U) The calculation of laminar boundary layer flow in two dimensions, using the Dorodnitsyn Method of Integral Relations, was successfully extended to separated regions. The extension requires incorporation of a square root term in the representation of the local shearing stress as a function of the streamwise velocity component. This limits the order of approximation that can be conveniently carried out for various flow configurations in plane flow and presents obstacles to the generalization of M.I.R. for three dimensional flow. The same difficulties arise in developing the orthonormal version of M.I.R. both for laminar and turbulent boundary layers. A recent paper treats laminar boundary layer flow in two dimensions by solving the Dorodnitsyn integral form of the equations of motion using a Finite Element Method. In the present paper this approach is extended to boundary layer flows dominated by positive pressure gradients. Free interaction couples the viscous and inviscid regions in which no iteration between theseregions is required. (Reprints)

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *FINITE ELEMENT ANALYSIS, *SUPERSONIC CHARACTERISTICS, COMPRESSION, COMPUTATIONS, COUPLING(INTERACTION), DOWNSTREAM FLOW, EQUATIONS OF MOTION, INTERACTIONS, INVISCID FLOW, LAMINAR BOUNDARY LAYER, LAMINAR FLOW, PRESSURE GRADIENTS, REPRINTS, THREE DIMENSIONAL FLOW, TURBULENT BOUNDARY LAYER, VELOCITY, VISCOSITY, FLOW SEPARATION, ITERATIONS.

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IDENTIFIERS: (U) Dorodnitsyn method.

AD-A186 239 12/3

FLORIDA UNIV GAINESVILLE DEPT OF MATHEMATICS

(U) Green's Function for a Ball.

86 8P

PERSONAL AUTHORS: Chung, K. L.

CONTRACT NO. AFOSR-85-0330

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1113

UNCLASSIFIED REPORT

ABSTRACT: (U) We obtain a new sharp inequality for the Green's function of Brownian motion on a ball. Keywords: Potential theory; Symmetry; Inequalities.

DESCRIPTORS: (U) *BROWNIAN MOTION, *GREENS FUNCTION, POTENTIAL THEORY, SPHERES, SYMMETRY, INEQUALITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 215 21/2 20/4 20/1

ILLINOIS UNIV AT URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) Effects of Turbulence on Stationary and Non-Stationary Processes in C-Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 85-30 Nov 86,

JUN 87 36P

PERSONAL AUTHORS: Roberts, Ted A.; Beddini, Robert A.

REPORT NO. AAE-87-1, UILU-ENG-87-0501

CONTRACT NO. AFOSR-85-0348

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-0980

UNCLASSIFIED REPORT

ABSTRACT: (U) Turbularization of an acoustic boundary layer (Stokes Layer) on impermeable and permeable surfaces is analytically considered. The theoretical approach uses a second-order closure model of turbulence. Both an approximate, closed-form solution and a more comprehensive finite difference solution of the time dependent, parabolic, one-dimensional governing equations are obtained. For simple acoustic boundary-layers on impermeable surfaces, both the approximate solution and the numerical results for the critical acoustic Mach number required for turbulent transition are qualitatively confirmed by experiment. Calculations for acoustic boundary-layers with transpiration (injection) indicate a substantial reduction of the acoustic Mach number required for transition, up to a limiting injection velocity that is frequency dependent. The results may provide a mechanism for flow-related combustion instability in practical systems, particularly solid propellent rockets, since turbularization of the near-surface combustion zone could result at relatively low acoustic Mach numbers. This report documents a completed phase of work which is concerned with the

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analysis of turbulent flow and heat transfer behavior in rocket chamber flows (C-systems). Keywords: Acoustic instability; Aeroacoustics; Solid propellent rocket engines; Transpiration; Turbulent boundary layer; Acoustic boundary layer; Combustion instability; Laminar boundary layer.

DESCRIPTORS: (U) *COMBUSTION STABILITY, *TURBULENT BOUNDARY LAYER, ACOUSTICS, AERODYNAMICS, BOUNDARY LAYER, TIME DEPENDENCE, COMBUSTION CHAMBERS, CHAMBERS, COMBUSTION, EQUATIONS, FINITE DIFFERENCE THEORY, FLOW, HEAT TRANSFER, INJECTION, LAMINAR BOUNDARY LAYER, LAYERS, LIMITATIONS, MACH NUMBER, METHODOLOGY, NUMERICAL ANALYSIS, PERMEABILITY, ROCKETS, SOLID PROPELLANT ROCKET ENGINES, SOLUTIONS(GENERAL), STABILITY, SURFACES, THEORY, TRANSITIONS, TRANSPIRATION, TURBULENCE, TURBULENT FLOW, VELOCITY.

IDENTIFIERS: (U) Rocket chamberflow, Stokes layer, Turbularization, Instability, Aeroacoustics, Acoustic instability, PE61102F, WUAFOSR2308A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 214 17/11

MASSACHUSETTS UNIV AMHERST DEPT OF COMPUTER AND INFORMATION SCIENCE

(U) Image Understanding by Image-Seeking Adaptive Networks (ISAN).

DESCRIPTIVE NOTE: Final technical rept. 1 May 83-30 Apr 86,

AUG 87

PERSONAL AUTHORS: Spinelli, D. N.

CONTRACT NO. AFOSR-83-0207

PROJECT NO. 2132

TASK NO. A1

MONITOR: AFOSR TR-87-1286

UNCLASSIFIED REPORT

ABSTRACT: (U) A remarkably simple, experimentally inspired, new theory of vision os presented. The theory takes into account the parallel architecture, the adaptive phenomena and the efferent control system which have been demonstrated in the vision systems of organisms. Further the complexities of visual receptive fields are made use of to explain the speed, noise resistance, consistencies and holistic aspects of perception. In this theory image understanding is achieved by image seeking adaptive networks that differentially amplify images of interest without first breaking them down into elementary components. A computer implementation of the theory demonstrates that the mechanisms postulated are feasible. A number of experiments with the model address critical aspects of image understanding and demonstrate that images of interest are captured reliably even in large amounts of noise, or in spite of position and/or size changes. Subjective edges, and other Gestalt like images, i.e. horizon and terrain are also seen by ISAN's basic network. Some implications for general vision are outlined.

DESCRIPTORS: (U) *ADAPTIVE SYSTEMS, *ARCHITECTURE, *HOMING, *IMAGES, *NETWORKS, *PARALLEL ORIENTATION,

AD-A186 214

AD-A186 214 CONTINUED

*TERRAIN, *VISION, EDGES, MODELS, PERCEPTION, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2132A1.

IAC NO. GC-880122

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)THEORIES, PERCEPTION, MODELS, EDGES, VISION, TERRAIN, NETWORKS, IMAGES, HOMING, GUIDANCE, ADAPTIVE SYSTEMS.;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 211 21/3

R AND D ASSOCIATES ALEXANDRIA VA WASHINGTON RESEARCH LAB

(U) Unified Study of Plasma-Surface Interactions for Space Power and Propulsion.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 85-31 Jul 86,

JUL 87 37P

PERSONAL AUTHORS: Turchi, Peter

REPORT NO. RDA-TR-133700-002

CONTRACT NO. F49620-85-C-0011

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1311

UNCLASSIFIED REPORT

ABSTRACT: (U) The interaction of a high speed (10-20 km/sec) plasma flow of modest temperature (0.5-5 eV) with a solid surface is a basic phenomenon in a variety of high specific power devices, such as advanced high specific impulse thrusters. Study of the details of processes involved in the immediate vicinity of the surface is normally precluded by the very limited diagnostic access afforded in mission-oriented devices. The present research program establishes a plasma flow by means of a quasi-steady magnetoplasmadynamic arcjet and exposes simple solid surfaces to this flow while examining the plasma surface interaction spectroscopically. Detailed measurements provide the benchmark for theoretical modeling that may then be applied to the more complex geometries of actual plasmadynamic devices. The present report covers the development and characterization of the arcjet plasma source and the initial results from experimental diagnostics focused near the surface of a dielectric blunt body in a high speed argon flow. Keywords: Electric propulsion.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), ARGON, BLUNT BODIES, DIELECTRICS, ELECTRIC PROPULSION, THRUSTERS,

AD-A186 211

AD-A186 211 CONTINUED

MAGNETOHYDRODYNAMICS, HIGH VELOCITY, INTERACTIONS, MISSIONS, MODELS, SOLID BODIES, SOLIDS, SPACE SYSTEMS, SURFACES, THEORY.

IDENTIFIERS: (U) Magnetoplasmadynamics, Plasma flood, PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 210 12/2

TENNESSEE UNIV KNOXVILLE DEPT OF MATHEMATICS

(U) Spectral Representation of Infinitely Divisible Processes.

DESCRIPTIVE NOTE: Interim rept.,

MAY 87 51P

PERSONAL AUTHORS: Rajput, Balram S.; Rosinski, Jan

CONTRACT NO. AFOSR-87-0136

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0985

UNCLASSIFIED REPORT

ABSTRACT: (U) The spectral representations for arbitrary discrete parameter infinitely divisible processes as well as for (centered) continuous parameter infinitely divisible processes, which are separable in probability, are obtained. The main tools used for the proofs are (I) a polar-factorization of an arbitrary Levy measure on a separable Hilbert space, and (II) the Wiener-type stochastic integrals of non-random functions relative to arbitrary infinitely divisible noise .

DESCRIPTORS: (U) *HILBERT SPACE, *SPECTRA, SEPARATION, TOOLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 209 12/9

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) On the Stability of Adaptive Lattice Filters.

87 5P

CONTRACT NO. N00014-85-K-0612, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-87-1355

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Conference on Acoustics, Speech and Signal Processing, p395-398 1987.

ABSTRACT: (U) A new approach to stability of adaptive filters is presented. The notion of constrained-input/constrained-output (CICO) stability is introduced as a generalization of the standard notion of bounded-input/bounded-output (BIBO) stability. This new notion involves a set of constraints on the filter data (i.e., signals and parameters) that, unlike boundedness, are specific to the filter in consideration. The set of all data that satisfy the constraints is the feasibility domain of the adaptive filter. Three particular adaptive lattice filters are analyzed: (i) Burg's lattice, (ii) the unnormalized RLS lattice, and (iii) the normalized RLS lattice. We derive the feasibility domains of these adaptive filters and prove that they are CICO stable.

DESCRIPTORS: (U) *ADAPTIVE FILTERS, SPEECH ANALYSIS, DOMAIN WALLS, FEASIBILITY STUDIES, LATTICE DYNAMICS.

IDENTIFIERS: (U) CICO(Constrained Input Constrained Output), BIBO(Bounded Input Bounded Output), PE61102F, WUAFOSR2304A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 208 12/4

OKLAHOMA UNIV NORMAN DEPT OF MATHEMATICS

(U) Estimation and Control of Distributed Models for Certain Elastic Systems Arising in Large Space Structures.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 85-30 Sep 86,

SEP 86 6P

PERSONAL AUTHORS: White, Luther W.

CONTRACT NO. AFOSR-84-0271

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1188

UNCLASSIFIED REPORT

ABSTRACT: (U) The research objective of this project is to study the estimation and control of elastic systems composed of beams and plates in order to develop efficient and accurate control and estimation algorithms. In the case of estimation basic to this goal is the development of an understanding of properties of the parameter to state mapping, an approximation theory associated with the particular models and minimization problems, and the suitability of different minimization algorithms for efficient codes for various problems. In control of prime importance is to determine properties of optimal controls and feedback, best location based on design of the actuators and the geometry and elastic properties of the body, and suitable algorithms and codes for control. Toward these objectives the work during the past year has centered primarily on the estimation and control of both static and dynamic linear models.

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *MATHEMATICAL MODELS, ACTUATORS, ALGORITHMS, APPROXIMATION(MATHEMATICS), CODING, CONTROL, CONTROL SYSTEMS, DISTRIBUTION, DYNAMICS, EFFICIENCY, ESTIMATES, LINEARITY, OPTIMIZATION, SPACECRAFT, THEORY, BEAMS(STRUCTURAL), PLATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

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AD-A186 207 12/9

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Parametrization of 2-D Lattice Filters,

MAY 87 5P

PERSONAL AUTHORS: Levi-Ari, H.; Parker, S. R.; Kailath, T.

CONTRACT NO. N00014-85-K-0612, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-87-1339

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Symposium on Circuits and Systems, p1022-1025 May 87.

ABSTRACT: (U) Recently introduced lattice-filter configurations for processing of two-dimensional signal fields consist of multiple-input/multiple-output (4x4) memoryless sections with J-orthogonal chain-scattering matrices. In this paper we characterize all possible parametrizations of such lattice sections and we analyze in some details two particular implementations. Our analysis establishes a fundamental connection between the flexibility in implementing multiple-input/multiple-output lattice sections and the non-uniqueness of matrix square roots. Hermitian square roots lead to implementations with interesting analytical properties, while triangular square roots lead to computationally-efficient implementations. (Reprints)

DESCRIPTORS: (U) *SIGNALS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUASOR2304A6.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 206 6/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF PSYCHOLOGY

(U) Sensitivity of Smooth Eye Movement to Small Differences in Target Velocity.

87 23P

PERSONAL AUTHORS: Kowler, Eileen; McKee, Suzanne P.

CONTRACT NO. AFOSR-85-0380, $AFOSR-85-0022

MONITOR: AFOSR TR-87-1274

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v27 n6 p993-1015, 1987.

ABSTRACT: (U) The precision of smooth pursuit eye movements was described by means of a new dependent measure, the 'oculomotor difference threshold' which represents the smallest difference in target velocity that produces statistically distinguishable differences in eye velocity. Oculomotor difference thresholds for constant velocity motions were largest during the initial 200 msec of target motion, despite fairly high average gains during the same period. Oculomotor difference thresholds declined over time. By about 600-700 msec after the onset of target motion they reached values a low as the perceptual difference thresholds measured psychophysically with the same target velocities. Nonsensory influences on smooth eye movement were also found. Keywords: Eye movements; Smooth pursuit; Velocity discrimination; Weber fraction; Difference threshold; Reprints.

DESCRIPTORS: (U) *EYE MOVEMENTS, *VISUAL PERCEPTION, MOTION, VELOCITY, EYE, MOVING TARGETS, TARGETS, THRESHOLD EFFECTS, REPRINTS, VISUAL TARGETS, DISCRIMINATION, OCULOMOTOR NERVE, PRECISION, THRESHOLDS(PHYSIOLOGY), SENSITIVITY.

AD-A186 206

AD-A186 205 20/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J

(U) Hybrid MacCormack and Implicit Beam-Warming Algorithms for a Supersonic Compression Corner.

MAR 87 9P

PERSONAL AUTHORS: Ong, C.; Knight, D.

CONTRACT NO. AFOSR-82-0040

MONITOR: AFOSR TR-87-1279

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in AIAA Jnl., v25 n3 p401-407 Mar 87. Presented at AIAA Aerospace Sciences Meeting (24th), Reno, NV, 6-9 Jan 86.

ABSTRACT: (U) A comparative study is made between the MacCormack explicit-implicit predictor-corrector and the Beam-Warming fully implicit algorithms for solving compressible viscous flow. The mass-averaged, two-dimensional compressible Navier-Stokes equations in strong conversation law form and general curvilinear coordinates are solved numerically by marching forth in time on a body-fitted curvilinear grid for a shock-wave/turbulent boundary-layer interaction over a two-dimensional compression corner. Computations are performed for a Mach number of 1.96 with a Reynolds number Resub delta sub infinity (based on the incoming-layer thickness delta sub infinity of 250,000 and for a Mach number of 2.83 with a Reynolds number of 1,800,000. The primary objectives of the study are 1) to determine the extent to which the steady-state solution obtained by the hybrid MacCormack algorithm is dependent upon the size of the time step employed in marching the calculation toward the steady-state solution, 2) to compare the two algorithms regarding accuracy and efficiency, and 3) to further examine the efficiency, and 3) to further examine the efficacy of the Baldwin-Lomax algebraic turbulent eddy-viscosity model through comparison with recent experimental measurements of the Reynolds shear stress. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *SUPERSONIC FLOW, *TURBULENT FLOW, ACCURACY, TURBULENT BOUNDARY LAYER,

AD-A186 205

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 205 CONTINUED

COMPRESSIBLE FLOW, COMPRESSION, COMPUTATIONS, EXPERIMENTAL DATA, GRIDS, INTERACTIONS, MEASUREMENT, MOMENTUM TRANSFER, NAVIER STOKES EQUATIONS, REYNOLDS NUMBER, SHEAR STRESSES, SHOCK WAVES, SOLUTIONS(GENERAL), STEADY STATE, SUPERSONIC CHARACTERISTICS, TURBULENCE, TWO DIMENSIONAL, VISCOUS FLOW, COMPUTERIZED SIMULATION, EDDIES(FLUID MECHANICS), HYBRID SIMULATION, REPRINTS.

IDENTIFIERS: (U) MacCormack algorithms, Beam Warming algorithms, Explicit implicit algorithms, Compression corners.

AD-A186 205

AD-A186 204 12/1 9/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Signal Processing Applications of Some Moment Problems,

JAN 87 41P

PERSONAL AUTHORS: Kailath, Thomas

CONTRACT NO. DAAG29-83-K-0028, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1031

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Moments in Mathematics, p1-40 Jan 87.

ABSTRACT: (U) This document presents some applications where results from moment problems have been useful in various ways, e.g., in suggesting new algorithms better suited to parallel computation and new structures better suited to integrated circuit realization. The author also describe how these applications have led to the need to go beyond some of the traditional confines of the moment problem, especially by imbedding the study of Toeplitz moment in those of a larger class of matrices with what we have called displacement structure. Keywords: Toeplitz equations; Lossless transmission lines; Energy conservation; Cholesky factorization; Reprints.

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTATIONS, *DISPLACEMENT, *EQUATIONS, *INTEGRATED CIRCUITS, *MOMENTS, *SIGNAL PROCESSING, *TRANSMISSION LINES, ENERGY CONSERVATION, LOSSES, PARALLEL ORIENTATION, REPRINTS, STRUCTURES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 203 7/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Laser-Excited Fluorescence Detection of SiH2 Producted in IR MPD (Infrared Multiple-Photon Dissociation) of Organosilanes.

DESCRIPTIVE NOTE: Interim rept.,

FEB 86 5P

PERSONAL AUTHORS: Thoman, J. W., Jr.; Steinfeld, J. I.

CONTRACT NO. F49620-86-C-0003, SAFOSR-83-0007

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1356

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v124 n1 p35-38, 7 Feb 86.

ABSTRACT: (U) Silicon Hydride has been identified as a photolysis product in the infrared multiple photon dissociation of RSiH3 (R = n-butyl, phenyl), arising from secondary IR MPD of silane produced in the initial four-center elimination step. The radiative lifetimes of levels show a strong rotational state dependence. The infrared multiple photon dissociation (IR MPD) of organosilanes has been observed to yield olefins, silane, and a deposit of adjacent surfaces identified as amorphous silicon (a:Si-H). The low silane olefin product ratios found in those experiments, and the accompanying deposition of a:Si-H, were attributed to secondary IR MPD of the vibrationally hot silane produced in the initial photolysis steps to yield silylene (SiH2). In order to verify this proposed mechanism, we have used laser excited fluorescence (LIF) to detect the SiH2 produced in this reaction.

DESCRIPTORS: (U) *PHOTOLYSIS, *SILANES, *SILICON, AMORPHOUS MATERIALS, DEPOSITION, DEPOSITS, DETECTION, DISSOCIATION, HIGH TEMPERATURE, HYDRIDES, INFRARED RADIATION, LASER INDUCED FLUORESCENCE, LIFE SPAN(BIOLOGY),

AD-A186 203 CONTINUED

OLEFIN POLYMERS, ORGANIC COMPOUNDS, PHOTONS, RADIATION, ROTATION, SURFACES, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFSOR2308B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 202 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Matrix Isolation of the First Silanediimine, N,N'-Bis(trimethylsilyl)silanediimine,

87

PERSONAL AUTHORS: Zigler, Steven S.; Welsh, Kevin M.; West, Robert

CONTRACT NO. F49620-86-C-0010, $AFOSR-84-0065

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1305

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v109 p4392-4393 1987.

ABSTRACT: (U) The first silanediimine, N,N'-bis(trimethylsily) (Me3SiN=Si=NSiMe3) (5) has been photochemically generated from 2,2-diazidohexamethyltrisilane (1) in hydro-carbon glasses at low temperatures. Photolysis of 1 at 254 nm leads first to the azido-silanimine Me3SiSi (N3)=NSiMe3, lambda max 274 nm, which undergoes further photolysis to produce 5. The silanediimine has an absorption maximum at 324 nm (epsilon = 2130 + or - 260 M/cm) and reacts with Me3SiOMe to give ((Me3Si)2N)2Si(OMe)2.

DESCRIPTORS: (U) *SILANES, *IMINES, GLASS, HYDROCARBONS, ISOLATION, LOW TEMPERATURE, MATRIX THEORY, PHOTOLYSIS, REPRINTS.

IDENTIFIERS: (U) *Imine/Silane, PE61102F, WUAFOSR2303A2.

AD-A186 202

AD-A186 201 7/4

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) State-Specific Orbital Alignment Effects in Electronic Energy Transfer: Sr(5s6p 1P1)+M Yields Sr(5s6p 3Pj, 4d5p 3F4, 3F3)+M,

JUL 87 9P

PERSONAL AUTHORS: Bussert, Wolfgang; Leone, Stephen R.

CONTRACT NO. AFOSR-84-0242

PROJECT NO. 2301

TASK NO. K1

MONITOR: AFOSR TR-87-1358

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v138 n2-3 p278-282, 17 Jul 87.

ABSTRACT: (U) Orbital alignment effects are investigated for an energy transfer process involving several competing pathways in the system Sr (5s6p1P1) + rare gases and H2. Most of the cross sections to poulate either (1) the combined 5s6p 3PJ and 4d5p 3F4 states or (2) the individual 4d5p 3F3 level show a marked preference for the perpendicular approach of the p orbital. However the cross section with He to populate the 3F3 state strongly favors the parallel orbital direction. Keywords: Alignment, Electronic energy transfer, Laser, Orbital effects, Strontium, Hydrogen.

DESCRIPTORS: (U) *ENERGY TRANSFER, *STRONTIUM, ALIGNMENT, CROSS SECTIONS, ELECTRON ENERGY, HYDROGEN, LASERS, ORBITS, PARALLEL ORIENTATION, RARE GASES, RIGHT ANGLES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301K1.

AD-A186 201

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 199 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) The Gas-Phase Structure of Dodecafluorooctahydrothiophene, c-C4F8SF4.

DESCRIPTIVE NOTE: Journal article,

86

PERSONAL AUTHORS: Gupta, Krishna D.; Shreeve, Jeanne M.; Oberhammer, Heinz

CONTRACT NO. AFOSR-82-0247, $NSF-CHE81-00156

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1184

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure, v147 p363-368 1987.

ABSTRACT: (U) The geometric structure of c-C4F8SF4 has been determined by gas-phase electron diffraction. The five-membered ring has the twist form (C2 symmetry) with a puckering amplitude q = 0.42 (2). The following principle geometric parameters (ra values) with estimated uncertainties have been derived: (C-C)av = 1.541 (10), S-C = 1.898(7), S-Fe = 1.558(6), S-Fa = 1.594(6) A, CSC = 90.0(9), SCC = 109.1(8). CCC = 106.5(12), FaSFe = 90.5(15) and FeSFe = 87.7(29). Vibrational amplitudes for long non-bonded C...F and F...F distances indicate a high barrier to pseudororation of the ring. Keywords: Gas phase electron diffraction, Conformational, Dynamic properties, Five membered rings, Rigid structure, High pseudorotation barrier.

DESCRIPTORS: (U) *THIOPHENES, AMPLITUDE, BARRIERS, DYNAMICS, ELECTRON DIFFRACTION, GEOMETRY, RIGIDITY, RINGS, VAPOR PHASES, VIBRATION, REPRINTS.

IDENTIFIERS: (U) Thiophenes/Dodecafluorooctahydro, PE61102F, WUAFOSR2303.

AD-A186 199

AD-A186 198 12/1

MARYLAND UNIV BALTIMORE COUNTY CATONSVILLE DEPT OF MATHEMATICS

(U) On the Convergence of the p-Version of the Boundary Element Galerkin Method.

DESCRIPTIVE NOTE: Summary rept.,

JUL 87 35P

PERSONAL AUTHORS: Stephan, E. P.; Suri, M.

CONTRACT NO. AFOSR-85-0322

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1046

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors consider various physical problems which may be formulated in terms of integral equations of the first kind, including the two-dimensional screen Neumann and Dirichlet problems in acoustics (and crack problems in elasticity). Sharp regularity results for the solutions are available for these problems. Proven is the convergence of the p-version for some Galerkin boundary element schemes based on the integral equation formulations. It is shown that the rate of convergence obtained by our method is twice that for the usual h-version.

DESCRIPTORS: (U) *CONVERGENCE, *INTEGRAL EQUATIONS, ACOUSTICS, BOUNDARIES, CRACKS, ELASTIC PROPERTIES, FORMULATIONS, PHYSICAL PROPERTIES, RATES.

IDENTIFIERS: (U) Helmholtz equation, *Galerkin method, Neumann problem, Dirichlet problem, Boundary element methods, PE61102F, WUAFOSR2304A3.

AD-A186 198

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 197 25/5

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) On the Approximation of the Output Process of Multi-User Random Access Communication Networks.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 34P

PERSONAL AUTHORS: Stavrakakis, I.; Kazakos, D.

REPORT NO. UVA/525677/EE87/102

CONTRACT NO. AFOSR-87-0095

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1294

UNCLASSIFIED REPORT

ABSTRACT: (U) A lot of work has been done towards the direction of developing communication protocols that determine how a single common resource can be efficiently shared by a large population of users. By now, it is well known that fixed assignment techniques are not appropriate for a system with large population of bursty users. In the latter case, random access protocols are more efficient and many of them have been suggested. Usually, the amount of information transmitted per time is of fixed length, called a packet. In most of the systems, time is divided into slots of length equal to the time needed for a packet transmission (slotted systems). The deployment of an ever increasing number of multi-user random access communication networks, Brought up the question of how packets whose destination is another network, should be handled. Thus, the issue of network interconnection or multi-hop packet transmission, arises, 3, 6, 7. The basic problem in analyzing interconnected systems is that of characterizing the output process of a multi-user random access communication system; i.e., the departure process of the successfully transmitted packets.

AD-A186 197 CONTINUED

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *NETWORKS, *SLOTS, CIRCUIT INTERCONNECTIONS, LENGTH, OUTPUT, POPULATION, RANDOM ACCESS COMPUTER STORAGE, RESOURCES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 197

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 196 20/4 12/1

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MATHEMATICS

(U) Progress Report for Grant AFOSR-83-0101.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 85-30 Sep 86,

OCT 86 9P

PERSONAL AUTHORS: Gunzburger, Max D.

CONTRACT NO. AFOSR-83-0101

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1158

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Finite Element Methods for the Ladyzhenskaya Model of Viscous Flow; Survey of Finite Element Methods for Incompressible Viscous Flows; Finite Element Methods for Hyperbolic Equations.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *VISCOUS FLOW, EQUATIONS, HYPERBOLAS, MODELS, MATHEMATICAL MODELS, INCOMPRESSIBLE FLOW, NONLINEAR DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A186 196

AD-A186 195 21/2

AEROCHEM RESEARCH LABS INC PRINCETON NJ

(U) Ionic Mechanisms of Soot Formation in Flames.

DESCRIPTIVE NOTE: Final rept. 15 Sep 83-31 Sep 86,

JUN 87 59P

PERSONAL AUTHORS: Calcote, H. F.; Keil, D. G.

CONTRACT NO. F49620-83-C-0150

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-87-1197

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental measurements have been made and interpreted in acetylene/oxygen and benzene/oxygen/argon flames at 2.7 kPa, and an unburned flow velocity of 50 cm/s with the objective of evaluating the ionic mechanism of soot nucleation. This mechanism postulates that chemi-ions are precursors of soot and that the initial reactions in the soot and nucleation process are ion-molecule reactions in which molecular ions continually increase in size until they are neutralized by ion combination. Total ion profiles were determined by Langmuir probe; individual ion profiles were determined by Langmuir probe; individual ion profiles were determined by molecular ion sampling mass spectrometry up to about mass 600; temperature profiles were determined by radiation corrected thermocouples. It is demonstrated that the ion concentration is greater that the concentration of soot particles; and ions decay as soot is produced. In the acetylene/oxygen, the ion-molecule reaction rates are measured and compared with other measured and calculated rates. It is demonstrated that these rates are rapid at flame temperatures. Some major differences were found in the features of benzene and acetylene ion profiles that remain to be explained. The experiments are strongly supportive of the ion mechanism of soot formation in flames.

DESCRIPTORS: (U) *FLAMES, *SOOT, ACETYLENE, ARGON,

AD-A186 195

AD-A186 195 CONTINUED

BENZENE, CHEMICAL REACTIONS, CORRECTIONS, DECAY, EXPERIMENTAL DATA, FLOW RATE, ION DENSITY, IONS, LANGMUIR PROBES, MEASUREMENT, MOLECULAR IONS, MOLECULES, NUCLEATION, OXYGEN, PRECURSORS, PROFILES, RADIATION, RATES, REACTION TIME, TEMPERATURE, THERMOCOUPLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A186 194 6/15

HARVARD MEDICAL SCHOOL BOSTON MA DEPT OF PHYSIOLOGY AND BIOPHYSICS

(U) Pharmacological Resetting of the Circadian Sleep-Wake Cycle.

DESCRIPTIVE NOTE: Annual technical rept. 1 May 86-30 Apr 87,

MAY 87 6P

PERSONAL AUTHORS: Moore-Ede, Martin C.

CONTRACT NO. AFOSR-86-0187

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1360

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project is investigating strategies to pharmacologically manipulate the circadian sleep-wake cycle in order to control the timing of alert function and of sleep in altered work schedule environments. In the past year we have investigated the benzodiazepines,diazepam (in hamsters) and triazolam (in squirrel monkeys), and have derived a phase response curve for each. In optically-enucleated hamsters, however, consistent phase shifts were not obtained suggesting that diazepam acts on light information-conveying pathways. Biochemical receptor binding studies are defining the benzodiazepine receptor density in various brain regions. In addition, the characterization of the circadian and homeostatic components of sleep in the squirrel monkey during sleep deprivation studies is being conducted in preparation for pharmacological manipulation with benzodiazepines. Keywords: Mathematical modeling; Jet-lag.

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, *HYPNOTICS AND SEDATIVES, BRAIN, CONSISTENCY, CONTROL, DIAZEPAM, GRAPHS, HAMSTERS, HOMEOSTASIS, MATHEMATICAL MODELS, PHASE SHIFT, RESPONSE, SCHEDULING, SLEEP, SLEEP DEPRIVATION, SQUIRREL MONKEYS, BIOCHEMISTRY, BRAIN, CIRCADIAN RHYTHMS, CONSISTENCY, CONTROL, DIAZEPAM, GRAPHS, HAMSTERS,

AD-A186 194 CONTINUED

HOMEOSTASIS, MATHEMATICAL MODELS, PHASE SHIFT, RESPONSE, SCHEDULING, SENSE ORGANS, SLEEP, SLEEP DEPRIVATION, SQUIRREL MONKEYS, CONSCIOUSNESS, JET LAG, HOMEOSTASIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A186 193 11/4 11/6 11/6.1

DREXEL UNIV PHILADELPHIA PA DEPT OF MATERIALS ENGINEERING

(U) Characterization of Microstructure in Metallic and Composite Materials.

DESCRIPTIVE NOTE: Final rept. 15 Dec 84-14 Dec 85,

AUG 87 4P

PERSONAL AUTHORS: Lawley, A.

CONTRACT NO. AFOSR-85-0045

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-87-1328

UNCLASSIFIED REPORT

ABSTRACT: (U) Drexel University's Department of Materials Engineering has acquired a state of the art optical metallograph and an image analysis system. The latter interfaces with the optical metallograph and a scanning electron microscope. The optical analysis system (Model DV-4400) for interfacing with the Zeiss Metallograph is designed to perform image enhancement, feature measurement and classification, utilizing a conventional TV camera. Interface with the scanning electron the operator to perform quantitative image analysis directly from the specimen in the microscope. In addition, the unit can determine relative x-ray intensity classification on the basis of chemistry.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *METALS, *MICROSTRUCTURE, CHEMISTRY, ELECTRON MICROSCOPES, ELECTRONIC SCANNERS, ENGINEERING, IMAGE PROCESSING, MATERIALS, OPTICAL ANALYSIS, OPTICAL EQUIPMENT, OPTIMIZATION, QUANTITATIVE ANALYSIS, TELEVISION CAMERAS, X RAYS, ALLOYS, METALLOGRAPHY.

IDENTIFIERS: (U) Scanning Electron Microscopy, PE61102F, WUAFOSR2917A3.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 192 5/8

MINNESOTA UNIV MINNEAPOLIS DEPT OF PSYCHOLOGY

(U) Computing Support for Basic Research in Perception and Cognition.

DESCRIPTIVE NOTE: Interim rept. 31 Jul 86-31 Jul 87,

AUG 87 24P

PERSONAL AUTHORS: Fletcher, Charles R.; Legge, Gordon E.; Nissen, Mary J.; Viemeister, Neal F.

CONTRACT NO. AFOSR-86-0280

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-87-1312

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the progress made during the first year of an equipment grant which has provided a common computing environment for four laboratories conducting research in perception and cognition at the University of Minnesota. Research in the Cognitive Psychology Laboratory has shown that learning a procedural skill can occur in the absence of any declarative learning. Progress has also been made toward developing a computer simulation of this process. In the Visual Psychophysics Laboratory several image-enhancement algorithms have been developed as well as a psychophysical procedure for evaluating those algorithms. Research in the Auditory Psychophysics Laboratory has concentrated on developing a model of the detection and recognition of complex auditory signals by human observers. A subset of the model has been implemented as a computer simulation and several experiments have been completed to guide its future direction. In the Psycholinguistics Laboratory a computer model of text comprehension and recall has been constructed. Several experiments have been completed that confirm assumptions built into the model and show a good correspondence between its performance and that of human subjects.

DESCRIPTORS: (U) *COGNITION, *COMPUTERIZED SIMULATION,

AD-A186 192

AD-A186 192 CONTINUED

ALGORITHMS, AUDITORY SIGNALS, DETECTION, HEARING, HUMANS, IMAGE INTENSIFICATION, PSYCHOLOGICAL LABORATORIES, LEARNING, MATHEMATICAL MODELS, OBSERVERS, PERCEPTION, PERCEPTION(PSYCHOLOGY), PSYCHOLINGUISTICS, PSYCHOPHYSICS, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 190 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Strong Convergence and Convergence Rates of Approximating Solutions for Algebraic Riccati Equations in Hilbert Spaces,

APR 87 23P

PERSONAL AUTHORS: Ito, Kazufumi

REPORT NO. LCDS/CCS-87-15

CONTRACT NO. AFOSR-85-0303, $AFOSR-84-0398

MONITOR: AFOSR TR-87-1314

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers the linear quadratic optimal control problem on infinite time interval for linear time-invariant systems define on Hilbert spaces. The optimal control is given by a feedback form in terms of solution pi to the associated algebraic Riccati equation (ARE). A Ritz type approximation is used to obtain a sequence pi sub n of finite dimensional approximations of the solution to ARE. A sufficient condition that shows N sub n converges strongly to pi is obtained. Under this condition, we derive a formula which can be used to obtain rate of convergence of N sub n to pi. We demonstrate and apply the results for the Galerkin approximation for parabolic systems and the averaging approximation for heredity differential systems. (Author)

DESCRIPTORS: (U) *CONVERGENCE, *GENETICS, *HILBERT SPACE, *RICCATI EQUATION, ALGEBRA, APPROXIMATION(MATHEMATICS), CONTROL, FINITE DIFFERENCE THEORY, INVARIANCE, OPTIMIZATION, PARABOLAS, RATES, SOLUTIONS(GENERAL), TIME, TIME INTERVALS, LINEAR ALGEBRAIC EQUATIONS, FEEDBACK, GAIN.

IDENTIFIERS: (U) Strong convergence.

AD-A186 190

AD-A186 185 25/4

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Complexity Reduced Lattice Filters for Digital Speech Processing,

87 5P

PERSONAL AUTHORS: Bistritz, Y.; Levi-Ari, H.; Kailath, T.

CONTRACT NO. AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1133

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Conference on Acoustic and Signal Processing, p21-24 1987.

ABSTRACT: (U) Several lattice forms and algorithms which constitute the immittance domain alternatives to the PARCOR lattice algorithm are presented. The immittance variables were shown to offer more efficient Levinson algorithms than the conventional scattering algorithms for both symmetric and Hermitian Toeplitz matrices. This paper presents the lattices associated with the new recursions and provides algorithms to determine their coefficients directly from the signal segments. The new lattices are of interest for speech processing as they offer a different parametrization and process real signal segments with only one multiplier and two adders per section. Complex signal segments require two adders per section. Stability conditions for the new parametrizations are also presented.

DESCRIPTORS: (U) *ALGORITHMS, *COEFFICIENTS, *DIGITAL SYSTEMS, *PROCESSING, *SIGNALS, *SPEECH, CRYSTAL FILTERS, LATTICE DYNAMICS, REDUCTION, SCATTERING, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A186 185

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 184 20/5

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Laser-Induced Fluorescence Modulation Techniques for Velocity Measurements in Gas Flows.

87 8P

PERSONAL AUTHORS: Hassa, C.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. F49620-83-K-0004, $AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-87-0991

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Experiments in Fluids 5, p240-246 1987.

ABSTRACT: (U) Broadband fluorescence of iodine, excited at 514.5 nm by a single-mode argon-ion laser tuned to the quasi-linear part of an absorption line, was used to detect the Doppler shift and hence the velocity of iodine molecules seeded in a nitrogen jet flow. The slope of the absorption line profile was measured directly using a frequency shift introduced by acoustooptic modulators (AOMs). A velocity of 36 m/s was measured in a jet of N2 at 60 Torr in 2 ms with an accuracy of 11%. To reduce experimental noise, the laser beams were switched at 125 KHz and signal-tuned amplification was used. Keywords: velocity, Iodine, Laser, Fluorescence.

DESCRIPTORS: (U) *ABSORPTION SPECTRA, *DOPPLER EFFECT, *IODINE, *LASER INDUCED FLUORESCENCE, ACOUSTOOPTICS, BROADBAND, FREQUENCY SHIFT, GAS FLOW, REPRINTS, LASER MODULATORS, JET FLOW, LASER BEAMS, LINE SPECTRA, MEASUREMENT, MODULATION, NITROGEN, NOISE, PROFILES, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A186 184

AD-A186 183 20/4 1/1

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) Treatment of Boundary Layer Separation Using Viscous-Inviscid Interaction Models.

86 11P

PERSONAL AUTHORS: Holt, Maurice

CONTRACT NO. AFOSR-83-0199

MONITOR: AFOSR
TR-87-1365

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the International Conference on Boundary and Interior Layer - Computational and Asymptotic Methods (4th), p80-88 1986.

ABSTRACT: (U) The treatment of separation of laminar and turbulent boundary layers using an inviscid-viscous flow matching approach is reviewed. In two dimensions this approach has been throroughly investigated and a number of numerical techniques have been tested sucessfully against experimental results. The approach was in initiated in a series of pioneer papers (Crocco and Lees, J. Aero. Sci., 1952, Le es and Reeves, AIAA J. 1964, Catherall and Mangler, J. Fluid Mech., 1966) in which the original Prandtl boundary layer concept was modified. Traditionally, in airfoil calculations, for example, the value of the pressure appearing in the boundary layer equations was calculated from an inviscid flow calculation past the airfoil profile. In the modified approach the inviscid calculation is to be applied to a profile displaced outwards through a distance equal to the boundary layer displacement thickness.

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *FLOW SEPARATION, AIRFOILS, COMPUTATIONS, DISPLACEMENT, EQUATIONS, TWO DIMENSIONAL FLOW, INTERACTIONS, INVISCID FLOW, MATCHING, MATHEMATICAL MODELS, NUMERICAL METHODS AND PROCEDURES, PRANDTL NUMBER, PRESSURE, SEPARATION, THICKNESS, TURBULENT BOUNDARY LAYER, VISCOUS FLOW, LAMINAR BOUNDARY LAYER.

IDENTIFIERS: (U) Viscid inviscid interactions.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 182 12/4

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTE MS ANALYSIS

(U) Estimating System Reliability: Monte Carlo Methods, Sensitivity and Errors in Input Parameters.

DESCRIPTIVE NOTE: Technical rept.,

JAN 87 23P

PERSONAL AUTHORS: Fishman, George S.

REPORT NO. UNC/ORSA/TR-87/1

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

MONITOR: AFOSR TR-87-1092

UNCLASSIFIED REPORT

ABSTRACT: (U) The computation of system reliability from component reliabilities presents a host of non-trivial problems for systems of varying sizes. These include the functional relationship between the time required to compute system reliability and system size. A second problem concerns how system reliability varies as component reliabilities vary. A third problem concerns how statistical errors in estimating component reliabilities affect the accuracy of the system reliability computation. This paper describes Monte Carlo techniques which provide useful answers to the first two problems and presents an analysis which establishes the potential seriousness of the third problem in practice.

DESCRIPTORS: (U) *RELIABILITY, *SYSTEMS ANALYSIS, ACCURACY, COMPUTATIONS, ERRORS, INPUT, MONTE CARLO METHOD, SIZES(DIMENSIONS), STATISTICS, PARAMETERS, SENSITIVITY.

IDENTIFIERS: (U) PE61102F.

AD-A186 182

AD-A186 181 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) On Determining the Weight for Obtaining a Large Number of Items.

DESCRIPTIVE NOTE: Technical rept.,

MAR 87 18P

PERSONAL AUTHORS: Yu, Kai F.

REPORT NO. TR-126

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1150

UNCLASSIFIED REPORT

ABSTRACT: (U) A simple procedure is proposed to determine a sample size for estimating the mean weight of items in a problem of obtaining a batch of a large number of items. Suppose it is desired to obtain a large number N (sub s) of items for which individual counting is impractical, but one can demand a batch to weigh at least w units and hope that the number of items in the batch is close to the desired number N(sub s). If the items have mean weight theta, it is reasonable to have w equal to theta N sub s when theta is known. When theta is unknown, one can take a sample of size n, not bigger than N(sub s), estimate theta by a good estimator theta sub n and set w equal to theta sub n/sub s. The proposed procedure determines the sample size to be the integer closest to rhe CN sub s, where C is a function of the cost coefficients if the coefficient of variation rhe is known. It is shown to be optimal in some sense. If rho is unknown, a simple sequential procedure is proposed for which the average sample number is shown to be asymptotically equal to the optimal fixed sample size. When the weights are assumed to have a gamma distribution given theta and theta has a prior inverted gamma distribution, the optimal sample size in some sense can be found to be the nonnegative integer closest to rhe CN

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 181 CONTINUED

sub s + rho squared A(Rho C-1), where A is a known constant given in the prior distribution. Keywords: Nonparametric; Sequential procedure; Bayes procedure.

DESCRIPTORS: (U) *STATISTICAL SAMPLES, *ESTIMATES, BAYES THEOREM, COEFFICIENTS, COSTS, INVERSION, MEAN, NUMBERS, PROBABILITY DISTRIBUTION FUNCTIONS, VARIATIONS, WEIGHT, SIZES(DIMENSIONS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 180 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) A Smooth Nonparametric Quantile Estimator from Right-Censored Data.

DESCRIPTIVE NOTE: Technical rept.,

MAY 87 25P

PERSONAL AUTHORS: Padgett, W. J.; Thombs, L. A.

REPORT NO. TR-127

CONTRACT NO. AFOSR-84-0156, $MIPR-ARO-139-85

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1321

UNCLASSIFIED REPORT

ABSTRACT: (U) Based on randomly right-censored data, a smooth nonparametric estimator of the quantile function of the lifetime distribution is studied. The estimator is defined to be the solution x sub n (p) to F sub n (p)) = 0, where F sub n is the distribution function corresponding to a kernel estimator of the lifetime density. The strong consistency and asymptotic normality of x sub n (p) are shown. Some simulation results comparing this estimator with the product of the bandwidth required for computing F sub n is investigated using bootstrap methods. Illustrative examples are given. (Author)

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, BANDWIDTH, DENSITY, DISTRIBUTION FUNCTIONS, KERNEL FUNCTIONS, SIMULATION, DISTRIBUTION FUNCTIONS.

IDENTIFIERS: (U) *Quantile functions, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 175 7/4

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Cooperative Optical Transitions in Impurity Centers Coupled Via Host Atoms.

JUL 87 7P

PERSONAL AUTHORS: Last, Isidore; Kim, Young S.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009, $NSF-CH385-19053

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1299

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v38 n2-3 p225-230, 17 Jul 87.

ABSTRACT: (U) In solids with a coupling between guest and host atoms, a new mechanism of cooperative transitions is possible since the centers formed by the guest atoms involve surrounding host atoms. This leads to orbital overlap between centers via the host atoms which can result in cooperative transitions. The cooperative transition moments are estimated for rare gas solids doped by halogens. Keywords: Cooperative optical transitions, Orbital overlap via host atmos, impurity centers, solids, rare gas solids, doped with halogens.

DESCRIPTORS: (U) *ATOMS, *SOLIDS, *TRANSITIONS, HALOGENS, IMPURITIES, MOMENTS, OPTICAL PROPERTIES, ORBITS, OVERLAP, RARE GASES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A186 174 12/1

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) An Algorithm that Exploits Symmetries in Bifurcation Problems,

87 20P

PERSONAL AUTHORS: Hackbusch, Wolfgang; Witsch, Kristian

CONTRACT NO. AFOSR-84-0315

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Notes of Numerical Fluid Mechanics, v16 p51-68 1987.

ABSTRACT: (U) Frequently bifurcations in nonlinear eigenvalue problems are due to symmetries in the problem. At bifurcation points the symmetries in the solution are typically reduced on the bifurcating branches. We present an algorithm that by making explicit use of the symmetry behavior of the solutions allows us to determine these in a reliable and efficient way. Numerical results are presented for a finite-difference discretization of a Duffing equation with periodic boundary conditions.

DESCRIPTORS: (U) *ALGORITHMS, *BIFURCATION(MATHEMATICS), *SYMMETRY, EFFICIENCY, EIGENVALUES, NONLINEAR ANALYSIS, NUMERICAL ANALYSIS, POINTS(MATHEMATICS), RELIABILITY, SOLUTIONS(GENERAL), FINITE DIFFERENCE THEORY, BOUNDARY VALUE PROBLEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 173 12/9

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) Spectral Analysis and Discrimination by Zero-Crossings,

NOV 86 21P

PERSONAL AUTHORS: Kedem, Benjamin

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR. AFOSR
TR-87-1077

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the IEEE, v74 n11 p1477-1493 Nov 86.

ABSTRACT: (U) We advance a coherent development of zero-crossing-based methods and theory appropriate for fast signal analysis. Quite a few ideas pertaining to zero-crossing counts found in the literature can be expressed and interpreted with the help of this more general setup. A central issue addressed in some detail is the fruitful connection which exists between zero-crossing counts and linear filtering. This connection is explored and interpreted with the help of a certain zero-crossing spectral representation, and is then applied in spectral analysis, detection, and discrimination. Zero-crossing counts in filtered time series are called higher order crossings. The theme of this work is that higher order crossings analysis provides a useful descriptive as well as an analytical tool that can in many respects match spectral analysis. To a great extent these two types of analysis are, in fact, equivalent, but each emphasizes a different point of view. Advantages offered by higher order crossings are great simplicity and a drastic data reduction. (Reprints)

DESCRIPTORS: (U) *CROSSINGS, *DETECTION, *LINEAR FILTERING, *SIGNALS, *SPECTRUM ANALYSIS, *TIME SERIES ANALYSIS, COHERENCE, DATA REDUCTION, FILTERS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 173

AD-A186 172 7/4

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Ion Angular Distribution of Species Desorbed from Single Crystal Sufaces by Electron Impact,

87 9P

PERSONAL AUTHORS: Yates, John T., Jr.; Alvey, Mark D.; Kolasinski, Kurt W.; Dresser, Miles J.

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-87-1293

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Nuclear Instruments and Methods in Physics Research, vB27 P147-154 1987.

ABSTRACT: (U) The measurements of the angular distribution of desorbing positive ions produced by electron impact desorption (ESDIAD) is of fundamental importance in understanding molecular structure in the chemisorbed layer. In this short review, two applications of ESDIAD to structural problems in the adsorbed layer will be described. Examples of strong chemisorption and weaker physical adsorption effects will be discussed. In addition, interactions between adsorbed species, leading to changes in bonding geometry will be described. The apparatus used for this work allows digitized acquisition of ion angular distributions in the absence of background effects due to soft X ray emission stimulated by electron impact. Keyword: Chemisorption physisorption, Stepped surfaces, Cyclopentene, Surface electric field, Silver nickel.

DESCRIPTORS: (U) *ELECTRON IMPACT SPECTRA, *NICKEL, *SILVER, *SINGLE CRYSTALS, ADSORPTION, ANGLES, BACKGROUND, BONDING, CHEMISORPTION, DESORPTION, DISTRIBUTION, ELECTRIC FIELDS, EMISSION, GEOMETRY, IONS, LAYERS, MOLECULAR STRUCTURE, SOFT X RAYS, STRUCTURAL PROPERTIES, SURFACES, REPRINTS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 172 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A186 171 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Dynamics of Solid-State Polymerization,

87 13P

PERSONAL AUTHORS: Prasad, Paras N.

CONTRACT NO. F4920-85-C-0052

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-87-1291

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Crystallographically Orderd Polymers, p106-116 1987.

ABSTRACT: (U) This paper presents studies of solid state polymerization aimed towards formulating a dynamic model of reactivity in the condensed phase. Phonon spectroscopy is successfully used to elucidate the mechanism of lattice control of the reaction. Novel concepts of phonon-assisted thermal and photochemical reactions are introduced, supported by experimental data. Non-linear laser spectroscopy is used to find the importance of biexcitonic processes in photopolymerization. Also, spectroscopic studies of reactions in Langmuir Blodgett films and at gas solid interface which produce ordered polymers are presented.

DESCRIPTORS: (U) *POLYMERIZATION, *POLYMERS, DYNAMICS, EXPERIMENTAL DATA, GASES, INTERFACES, LASERS, MODELS, NONLINEAR SYSTEMS, ORDER DISORDER TRANSFORMATIONS, PHONONS, PHOTOCHEMICAL REACTIONS, REACTIVITIES, SOLIDS, SPECTROSCOPY, THERMAL PROPERTIES, SOLIDS, CRYSTAL LATTICES, MOLECULAR STRUCTURE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A186 172

AD-A186 171

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A136 170 21/2 20/4

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Visualization of the Structure of a Pulsed Methane-Air Diffusion Flame.

AUG 85 6P

PERSONAL AUTHORS: Strawa, Anthony W.; Cantwell, Brian J.

CONTRACT NO. F49620-83-K-0004, $AFOSR-84-0373

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-87-1292

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. Physics of Fluids, v28 n8 p2317-2320 Aug 85.

ABSTRACT: (U) Experiments have been carried out in a variable pressure flow facility with the objective of studying the structure of a co-flowing jet diffusion flame. The flow is visualized using an optical scheme which superimposes the luminous image of the flame on its Schlieren image. This gives a useful picture of the relationship between the bright, yellow-orange, soot-laden core flow and the edge of the surrounding hot gas envelope. A loudspeaker is used to force the central fuel jet at several frequencies. In the unforced flow and over most of the driving frequency range in the forced flow, a double structure is observed with two distinct wavelengths: a long wavelength associated with the luminous, buoyancy-driven core flow and a short wavelength associated with the shear-driven outer flow. Excitation at the proper frequency causes strong coupling to occur. In this case the core flow pinches off and the flame breaks up into a series of flamelets moving with a single wavelength.

DESCRIPTORS: (U) *JET FLOW, *FLAME PROPAGATION, *FLOW VISUALIZATION, BUOYANCY, CORES, ENVELOPE(SPACE), FACILITIES, FLOW, FREQUENCY, FUELS, HOT GASES, IMAGES, LONG WAVELENGTHS, LOUDSPEAKERS, LUMINOSITY, OPTICAL PROPERTIES, SCHLIEREN PHOTOGRAPHY, SHORT WAVELENGTHS,

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AD-A186 170 CONTINUED

VARIABLE PRESSURE, METHANE, AIR, COMBUSTION, MODELS, HOT GASES.

IDENTIFIERS: (U) Flamelets, Diffusion Flames, PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 169 7/2

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Vibrational Motions of Buckminsterfullerene,

JUN 87 5P

PERSONAL AUTHORS: Wu, Z. C.; Jelski, Daniel A.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-1297

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Chemical Physics Letter, v137 n3 p291-294, 12 Jun 87.*

ABSTRACT: (U) A non-Cartesian coordinate system is developed which permits the vibrational motions of Buckminsterfullerene (Bucky ball) to be expressed in terms of four force constants. A 180 x 180 matrix is then derived which, when diagonalized, yields the complete vibrational spectrum. These results are compared with those obtained previously via a MNDO calculation. Keywords: Buckminsterfullerene; Carbon cluster; Complete vibrational spectrum; Non cartesian coordinates; Four force constants; Matrix.

DESCRIPTORS: (U) *CARBON, *CLUSTERING, CARTESIAN COORDINATES, CONSTANTS, FORCE(MECHANICS), MOTION, SPECTRA, VIBRATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A186 169

AD-A186 168 7/4

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Molecular Lifetimes in the Presence of Periodically Roughened Metallic Surfaces,

JUL 87 6P

PERSONAL AUTHORS: Leung, P. T.; Wu, Z. C.; Jelski, Daniel A.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009, $NSF-CHE86-20274

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v36 n3 p1475-1479, 15 Jul 87.

ABSTRACT: (U) The lifetimes of molecules located close to a sinusoidal grating surface are studied within a classical phenomenological model. The contribution of surface roughness to the molecular decay rate is attributed to the discrepancy between the experiments of Rossetti and Brus and the theory of Chance, Prock, and Sibley. It is found that surface roughness can either enhance or diminish the flat-surface value for the decay rate depending on the emitting frequency, molecule-surface distance and the molecular orientation. Keywords: Molecular lifetimes; Metallic surfaces; Periodically roughened; Molecule surface distance; Molecular orientation; Classical model.

DESCRIPTORS: (U) *METALS, *SURFACES, DECAY, EMISSION, FREQUENCY, LIFE EXPECTANCY(SERVICE LIFE), LIFE SPAN(BIOLOGY), MOLECULES, ORIENTATION(DIRECTION), RANGE(DISTANCE), RATES, SURFACE ROUGHNESS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A186 168

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 167 7/5

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) The Plasmon Dispersion Relation on a Rough Surface: A Simple Approximation,

87 5P

PERSONAL AUTHORS: Jelski, Daniel A.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-1298

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 n14 p3779-3782 1987.

ABSTRACT: (U) This paper is concerned with periodic, laser-induced, chemical vapor deposition recently observed experimentally. In order to inquire further into this phenomenon, it is first necessary to find a simple means of calculating the plasmon field strength for relatively deep gratings. The Rayleigh hypothesis is assumed, and only p-polarized, normally incident light is considered. A closed-form equation for the plasmon field intensity is then derived. Also discussed is the benavior of the plasmon dispersion relation for a shallow grating, but for a complex dielectric constant where the imaginary part is not necessarily small. Keywords: Plasmons; Chemical vapor deposition; P-polarized light; Complex dielectric constant. (Reprints)

DESCRIPTORS: (U) *PHOTOCHEMICAL REACTIONS, *LASER PUMPING, CHEMICAL REACTIONS, CONSTANTS, DIELECTRIC PROPERTIES, DISPERSION RELATIONS, FIELD INTENSITY, GRATINGS(SPECTRA), PLASMONS, REPRINTS, SHALLOW DEPTH, SURFACE ROUGHNESS, VAPOR DEPOSITION.

IDENTIFIERS: (U) Rayleigh hypothesis, PE61102F, WUAFOSR2303A2.

AD-A186 167

AD-A186 166 12/1

EMORY UNIV ATLANTA GA DEPT OF MATHEMATICS AND COMPUTER SCIENCE

(U) New Methods for Numerical Solution of One Class of Strongly Nonlinear Partial Differential Equations with Applications.

DESCRIPTIVE NOTE: Annual rept.,

86 12P

PERSONAL AUTHORS: Oliker, V. I.; Waltman, P.

CONTRACT NO. AFOSR-84-0285

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1191

UNCLASSIFIED REPORT

ABSTRACT: (U) The physical phenomena described by nonlinear partial differential equations have become at present the central theme of investigations by many researchers. A good understanding of most physical processes requires accounting for nonlinear effects and, consequently, methods for studying nonlinear equations have to be developed. Among nonlinear equations the Dirichlet problem for the Monge-Ampere equation is the model case for fully nonlinear equations.

DESCRIPTORS: (U) *NONLINEAR DIFFERENTIAL EQUATIONS, *PARTIAL DIFFERENTIAL EQUATIONS, DIRICHLET INTEGRAL, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, PHYSICAL PROPERTIES, SOLUTIONS(GENERAL), MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A186 166

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 165 12/3 12/9 12/2

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTE R SCIENCES

(U) Calculating Error Probabilities for Intersymbol and Cochannel Interference,

MAY 86 6P

PERSONAL AUTHORS: Helstrom, Carl W.

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1045

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. IEEE Transactions on Communications, vCOM-34, n5 p430-435 May 86.

ABSTRACT: (U) The probability of error in a binary symmetric channel with intersymbol interference and additive noise is efficiently calculated by numerical quadrature of a Laplace inversion integral along a contour in the complex plane passing through a saddlepoint of the integrand. For Gaussian noise a bound is set on the truncation error incurred by necessarily restricting the integration to a finite interval. The probability of error resulting from cochannel interference is calculated by a similar technique.

DESCRIPTORS: (U) *INTERSYMBOL INTERFERENCE, *LAPLACE TRANSFORMATION, *NUMERICAL QUADRATURE, *PROBABILITY, ERRORS, INTERVALS, INVERSION, TRUNCATION.

IDENTIFIERS: (U) PE61102F, WUASOR2304A5.

AD-A186 165

AD-A186 164 12/3

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Some Properties of Maximum Likelihood Strategy for Re-Pairing Broken Random Sample.

DESCRIPTIVE NOTE: Technical rept. 1 Jul 84-30 Jun 86,

JAN 86 17P

PERSONAL AUTHORS: Goel, Prem K.; Ramalingam, T.

REPORT NO. OSURF-716366, TR-335

CONTRACT NO. AFOSR-84-0162, $NSF-DMS84-00687

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-87-1176

UNCLASSIFIED REPORT

ABSTRACT: (U) Matching data from a bivariate population is considered when observations are available only in the form of a broken random sample. In other words, a random sample of n pairs is drawn from the population but the observed data consist of n observations on the second component and the n observations on an unknown permutation of the first component of the n pairs of data. A maximum likelihood matching strategy is revisited. The proportion of approximately correct matches (due to Yahav) is used to evaluate the performance of the pairing strategy as n approaches limit of infinity. The small sample behavior of this proportion is studied via a Monte-Carlo simulation in the special case of bivariate normal parent population. Keywords: Asymptotic properties; Statistical data; Tables(data).

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, *STATISTICAL SAMPLES, ASYMPTOTIC SERIES, BIVARIATE ANALYSIS, LIMITATIONS, MATCHING, MONTE CARLO METHOD, POPULATION, SIMULATION, STATISTICAL DATA, STRATEGY, TABLES(DATA), REPAIR.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K3.

AD-A186 164

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 159 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Strong Laws of Large Numbers for Arrays of Orthogonal Random Variables.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

DEC 86 17P

PERSONAL AUTHORS: Moricz, F .; Taylor, R. L.

REPORT NO. TR-174

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1001

UNCLASSIFIED REPORT

ABSTRACT: (U) This document describes Hilbert Space Valued Random Variables. Keywords: Banach space: Orthogonality arrays.

DESCRIPTORS: (U) *HILBERT SPACE, *RANDOM VARIABLES, BANACH SPACE, ORTHOGONALITY, STOCHASTIC PROCESSES, ARRAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 159

AD-A186 157 20/1

BRIGHAM YOUNG UNIV PROVO UTAH DEPT OF CHEMICAL ENGINEERING

(U) Characterizing Particle Combustion in a Rijke Burner.

DESCRIPTIVE NOTE: Interim rept. Feb 86-May 87,

MAY 87 24P

PERSONAL AUTHORS: Finlinson, J .C.; Nelson, R. W.; Nelson, M. A.; Beckstead, M. W.

CONTRACT NO. AFOSR-83-0157

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-87-0961

UNCLASSIFIED REPORT

ABSTRACT: (U) The principle objective of this study is to identify and develop an understanding of the mechanisms whereby acoustic suppressants modify an acoustic wave. The experimental bases for the technical approach of this study is a Rijke burner which generates combustion oscillations. During the past year three major modifications were made to the Rijke burner to facilitate obtaining more reproducible data: (1) The cooling jacket was rebuilt to give better heat transfer characteristics, and a flowmeter was incorporated to allow a quantitative control of the cooling water flow. (2) A digital data acquisition system was interfaced with the burner to allow monitoring more variables, and to improve data reduction techniques. (3) A new damping device consisting of a butterfly valve and a sound absorbing cone below the burner was developed to allow greater damping. Acoustic growth rate data have been obtained a nominal frequency of 1200 Hz varying the mass flow rate, the oxidizer/fuel ratio, and the relative amount of nitrogen. In all cases, the growth rate increases as the energy release rate (or temperature) increases. These data will now be compared to the previously developed model to better understand the physical mechanisms driving the acoustic oscillations. The model is also being modified to incorporate various submodels for different types of particulates. Keywords:

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 157 CONTINUED

Unstable combustion, Acoustic instability.

DESCRIPTORS: (U) *ACOUSTIC DATA, *ACOUSTICS, *HEAT TRANSFER, *OSCILLATION, ACOUSTIC ABSORPTION, ACOUSTIC WAVES, BURNERS, BUTTERFLY VALVES, COMBUSTION, CONICAL BODIES, COOLING, DAMPING, DATA BASES, DATA REDUCTION, DIGITAL SYSTEMS, ENERGY TRANSFER, FLOW RATE, FUELS, GROWTH(GENERAL), JACKETS, MASS FLOW, METHODOLOGY, NITROGEN, OXIDIZERS, PARTICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A186 157

AD-A186 156 7/4

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Fundamental Studies of Surfaces Processes and Trace Analysis Using Solid Electrodes.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 83-31 Dec 86

AUG 87 17P

PERSONAL AUTHORS: Bruckenstein, Stanley

CONTRACT NO. AFOSR-83-0004

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-87-1027

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the work carried out unoer this grant was to perform physical electrochemical and electroanalytical studies at various kinds of solid electrodes. The physical electrochemical investigations were divided into studies of heterogeneous electrode kinetics, underpotential deposition and electrocatalysis. The electroanalytical work areas involved trace analysis of solutions using hydrodynamic voltammetry and of solutions and gases using porous electrode structures. Novel porous electrode techniques were developed for the analysis of trace species present in both liquid and gas phases. Two novel and simple electronic circuits were developed for electrochemical applications.

DESCRIPTORS: (U) *ELECTRODES, *SURFACES, *TRACER STUDIES, CATALYSIS, CIRCUITS, ELECTROCHEMISTRY, ELECTRONICS, GASES, HETEROGENEITY, HYDRODYNAMICS, KINETICS, PHASE, PHYSICAL PROPERTIES, POROUS MATERIALS, SOLIDS, SOLUTIONS(GENERAL), VOLTAMMETRY.

IDENTIFIERS: (U) PE61102F, WUASOR2303A1.

AD-A186 156

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 155 12/9 12/6

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) University Research Instrumentation Procurement.

DESCRIPTIVE NOTE: Final rept.,

APR 86 4P

PERSONAL AUTHORS: Wilson, Stephen G.

CONTRACT NO. AFOSR-85-0120

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR TR-87-0969

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describe procurements made under contract number AFOSR-85-0120, as part of the Department of Defense, University Research Instrumentation Program. The equipment purchased is in support of analysis and encoding of color motion imagery. Installation of all equipment has been completed and is functional, attached to a VAX 11/750 in the Department of Electrical Engineering and the Center for Computer Aided Engineering. The major expenditure was for a Gould IP8400 imaging system with high-speed (30 frames per second) color storage and display. This system is operated as a peripheral on the VAX 11/750 running UNIX. To support image processing tasks, a CDA Array Processor was also purchased and attached to the system bus. Finally, to aid in data presentation, a hard-copy print camera was purchased from NISE Corp. The equipment is presently being used for a variety of image processing tasks, both for still and moving images. Plans include doing computer vision research and interdisciplinary work with groups who need real-time display of imagery.

DESCRIPTORS: (U) *IMAGE PROCESSING, *PROCESSING EQUIPMENT, ARRAYS, COLORS, COMPUTER AIDED DESIGN, DEPARTMENT OF DEFENSE, DISPLAY SYSTEMS, ELECTRICAL ENGINEERING, ENGINEERING, IMAGES, INSTALLATION, INSTRUMENTATION, MOTION, PROCUREMENT, REAL TIME, VISION.

AD-A186 155

AD-A186 155 CONTINUED

IDENTIFIERS: (U) VAX 11/750 computers, PE61102F, WUAFOSR2917A5.

AD-A186 155

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 145 20/3

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) A Two-Dimensional Ising Model in a Magnetic Field - A Scalar Representation of the Partition Function,

87 13P

PERSONAL AUTHORS: Chitlaru-Briggs, Sanda; Barouch, Eytan

CONTRACT NO. AFOSR-86-0249, $NSF-CBT84-20786

MONITOR: AFOSR TR-87-1315

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Studies in Applied Mathematics, v77 p89-100 1987.

ABSTRACT: (U) The partition function of the two-dimensional Ising model in the presence of a magnetic field is expressed as a fourfold integral of a double product of elementary functions. The correlation functions and the magnetization per site are obtained as well. (Reprints).

DESCRIPTORS: (U) *MAGNETIC FIELDS, CORRELATION, FERROMAGNETIC MATERIALS, FUNCTIONS(MATHEMATICS), MAGNETIZATION, REPRINTS, SCALAR FUNCTIONS, TWO DIMENSIONAL.

IDENTIFIERS: (U) *Ising model, Partition Functions.

AD-A186 144 12/4

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Asymptotic Agreement and Convergence of Asynchronous Stochastic Algorithms,

AUG 87 8P

PERSONAL AUTHORS: Li, Shu; Basar, Tamer

CONTRACT NO. AFOSR-84-0056

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1130

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n7 p612-618 Jul 87.

ABSTRACT: (U) This paper presents results on the convergence and asymptotic agreement of a class of asynchronous stochastic distributed algorithms which are in general time-varying, memory-dependent, and not necessarily associated with the optimization of a common cost functional. It is shown that convergence and agreement can be reached by distributed learning and computation under a number of conditions, in which case a separation of fast and slow parts of the algorithm is possible, leading to a separation of the estimation part from the main algorithms.

DESCRIPTORS: (U) *ALGORITHMS, *STOCHASTIC PROCESSES, ASYNCHRONOUS SYSTEMS, CONVERGENCE, COSTS, REPRINTS, DISTRIBUTION, ESTIMATES, LEARNING, TIME, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 143 12/1

CORNELL UNIV ITHACA NY

(U) Knotted Periodic Orbits in Suspensions of Annulus Maps,

87 29P

PERSONAL AUTHORS: Holmes, P. J.

CONTRACT NO. AFOSR-84-0051

MONITOR: AFOSR
TR-87-1320

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Royal Society of London, vA411 p351-378 1987.

ABSTRACT: (U) Consider a class of suspensions of diffeomorphisms of the annulus as flows in the orientable 3-manifold T-sq x I. Construct a knotholder or template that carries the set of periodic orbits of the flow. We define rotation numbers and show that any orbit of period q and rotation number p/q can be arranged as a positive braid on p strands. This yields existence and uniqueness results for families of resonant torus knots (p-braids that are (p,q)-torus knots of period q > p), which correspond to order-preserving (Birkhoff-) periodic orbits of the diffeomorphism. Show that all other q-periodic p-braids have higher genus, and establish bounds on the genera of such knots. Obtain existerce and uniqueness results for a number of other, non-resonant, torus knots, including non-order-preserving (q + s, q)-torus knots of rotation number 1. (Reprints)

DESCRIPTORS: (U) *ORBITS, BRAIDS, NUMBERS, REPRINTS, ROTATION.

IDENTIFIERS: (U) Manifolds(Mathematics), Knots, Bifurcation Theory.

AD-A186 143

AD-A186 142 20/3

CORNELL UNIV ITHACA NY DEPT OF THEORETICAL AND APPLIED MECHANICS

(U) Evidence for Homoclinic Orbits as a Precursor to Chaos in a Magnetic Pendulum,

87 9P

PERSONAL AUTHORS: Moon, F. C.; Cusumano, J.; Holmes, P. J.

CONTRACT NO. AFOSR-84-0051

MONITOR: AFOSR
TR-87-1317

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physica, v24D p383-390 1987.

ABSTRACT: (U) Experimental evidence is presented which supports the theory that homoclinic orbits in a Poincare map associated with a phase space flow are precursors of chaotic motion. A permanent magnet rotor in crossed steady and time-varying magnetic fields is shown to satisfy a set of third order differential equations analogous to the forced pendulum or to a particle in a combined periodic and traveling wave force field. Critical values of magnetic torque and forcing frequency are measured for chaotic oscillations of the rotor and are found to be consistent with a lower bound for the existence of homoclinic orbits derived by the method of Melnikov. The fractal nature of the strange attractor is revealed by a Poincare map triggered by the angular position of the rotor. Numerical simulations using the model also agree well with both theoretical and experimental criteria for chaos.

DESCRIPTORS: (U) *PENDULUMS, *ENTROPY, ANGLES, DIFFERENTIAL EQUATIONS, MAGNETIC FIELDS, MAGNETIC FORCES, NUMERICAL ANALYSIS, PERMANENT MAGNETS, POSITION(LOCATION), REPRINTS, ROTORS, TORQUE, TRAVELING WAVES, DIGITAL SIMULATION.

IDENTIFIERS: (U) *Magnetic pendulums, CHAOS, Homoclinic orbits, Poincare maps.

AD-A186 142

AD-A186 141 20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Annual rept. Apr 86-Apr 87,

JUN 87 23P

PERSONAL AUTHORS: Dimotakis, P. E.; Broadwell, J. E.; Leonard, A.

CONTRACT NO. AFOSR-83-0213

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1160

UNCLASSIFIED REPORT

ABSTRACT: (U) Work continues primarily in gas phase turbulent mixing amd chemical reactions with extensions to compressible (supersonic) shear layers. In the gas phase shear layer work, investigations concentrate on subsonic shear layer free stream density ratio effects, and a design effort in support of the planned extension of the hydrogen-fluorine shear flow facility to supersonic flows. In jet flows, measurements of gas phase jet mixing, using laser Rayleigh scattering techniques developed for conserved scalar measurements down to diffusion space and time scales, are in progress. A first publication has just appeared on an experiment in which digital imaging of soot in turbulent flames was used to describe combustion flame sheets in methane flames. Analytical/computational modeling efforts included development of quantitative description of turbulent jet mixing and chemical reactions including finite Damkoehler number effects; supersonic shear layer combustion studies of finite kinetic rate (Damkoehler number) effects for H2/F2/NO and H2/air systems; a new analytical model for turbulent shear layer mixing and chemical reactions; and extensions of hydrodynamic stability calculations to include Mach number effects in supersonic shear layers.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *MIXING,

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AD-A186 141 CONTINUED

*TURBULENT FLOW, *VAPOR PHASES, COMBUSTION, COMPUTATIONS, DIGITAL SYSTEMS, FLAMES, HYDRODYNAMICS, IMAGES, JET FLOW, JET MIXING FLOW, LASERS, LAYERS, LIGHT SCATTERING, MACH NUMBER, MATHEMATICAL MODELS, MEASUREMENT, METHANE, RATIOS, RAYLEIGH SCATTERING, REACTION KINETICS, SCALAR FUNCTIONS, SCALE, SHEAR PROPERTIES, SHEETS, SOOT, STABILITY, SUPERSONIC CHARACTERISTICS, SUPERSONIC FLOW, TIME, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 140 22/2 20/11

WEA CAMBRIDGE MA

(U) Wave Propagation Experiments on 22-Bay Lattice.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 85-1 Jun 87,

JUN 87 37P

PERSONAL AUTHORS: Williams, James H., Jr.; Zhang, Jia J.

CONTRACT NO. F49620-85-C-0148

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-87-1289

UNCLASSIFIED REPORT

ABSTRACT: (U) Wave propagation characteristics of large space structures (LSS) affect their performance, integrity and the ability to nondestructively assess their integrity. In this study, wave propagation characteristics of an aluminum 22-bay planar lattice structure are determined experimentally. Two ultrasonic piezoceramic longitudinal transducers are mounted at various locations on the structure. Wave measurements are obtained by injecting an impulsive load via the transmitting transducer and recording the response via the receiving transducer. The waves injected into the structure are longitudinal waves, transverse to the surface, although a complex stress distribution which may be described by directivity functions is actually realized. The impulsive loading signal has a broad frequency spectrum containing frequencies greater than 0.5MHz.

DESCRIPTORS: (U) *IMPULSE LOADING, *SPACECRAFT, *TRANSDUCERS, *WAVE PROPAGATION, *WAVES, DISTRIBUTION, FREQUENCY, MEASUREMENT, POSITION(LOCATION), SIGNALS, STRESSES, SURFACES, TRANSVERSE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A186 140

AD-A186 139 20/11 22/2

WEA CAMBRIDGE MA

(U) Natural Frequencies and Structural Integrity Assessment of Large Space Structures.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 85-1 Apr 87,

APR 87 39P

PERSONAL AUTHORS: Williams, James H., Jr.; Nagem, Raymond J.

CONTRACT NO. F49620-85-C-0148

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-87-1290

UNCLASSIFIED REPORT

ABSTRACT: (U) In a previous report, transfer matrices and joint coupling matrices are used to compute natural frequencies of vibration of a five-bay planar lattice structure. In this report, the problem of detecting damage in the five-bay planar lattice structure is considered. Seven different states of damage are assumed. Each damage state corresponds to a disconnected or partially disconnected joint in the lattice. Transfer matrices and joint coupling matrices are used to compute natural frequencies associated with each damage state. The natural frequencies computed for each damage state are significantly different from the natural frequencies of the undamaged lattice; for example, the frequencies of the first flexible mode of the damaged lattice are 26% to 83% lower than the frequency of the first flexible node of the undamaged lattice. The results presented here demonstrate that measurement of natural frequencies is a potentially useful method for detecting damage in lattice structures, at least, for the types of damage considered here. However, it is also shown here that measurement of natural frequencies alone is not sufficient, in general, to determine the location of damage within the lattice structure. Thus, measurement of natural frequencies should be regarded as only a part of a complete nondestructive evaluation method. After the results

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 139 CONTINUED

obtained here are presented, some suggestions for NDE methods which may be capable of providing more quantitative measures of structural integrity are given.

DESCRIPTORS: (U) *SPACE STATIONS, *STRUCTURAL RESPONSE, *SPACECRAFT COMPONENTS, DAMAGE, MATRICES(MATHEMATICS), MEASUREMENT, NODES, NONDESTRUCTIVE TESTING, RELIABILITY, RESONANT FREQUENCY, SPACECRAFT, STRUCTURAL PROPERTIES, TRANSFER FUNCTIONS, VIBRATION.

IDENTIFIERS: (U) Large space structures, PE61102F, WUAFOSR2302B1.

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CALIFORNIA INST OF TECH PASADENA DEPT OF APPLIED MATHEMATICS

(U) Homoclinic Orbits in Slowly Varying Oscillators,

MAY 87 19P

PERSONAL AUTHORS: Wiggins, Stephen; Holmes, Philip

CONTRACT NO. AFOSR-84-0051

MONITOR: AFOSR TR-87-1318

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Mathematical Analysis, v18 n3 p612-629 May 87.

ABSTRACT: (U) Existence and bifurcation theorems are obtained for homoclinic orbits in three dimensional flows that are perturbations of families of planar Hamiltonian systems. The perturbations may or may not depend explicitly on time. The results of periodic orbits of the preceeding paper are related to the present homoclinic results, and to a periodically forced Duffing equation with weak feedback. Keywords; Bifurcation; Hamiltonian system; Homoclinic orbit; Perturbation theory; Melnikov method; Reprints.

DESCRIPTORS: (U) *HAMILTONIAN FUNCTIONS, *ORBITS, *OSCILLATORS, *PERTURBATION THEORY, FEEDBACK, LOW STRENGTH, PERTURBATIONS, PLANAR STRUCTURES, REPRINTS, THREE DIMENSIONAL FLOW.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 134 12/2

MARYLAND UNIV COLLEGE PARK

(U) Detection of Periodicities by Higher-Order Crossings,

87 14P

PERSONAL AUTHORS: Kedem, Benjamir

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1135

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Time Series Analysis, v8 n1 p39-50 1987.

ABSTRACT: (U) The axis-crossing counts in time series and in its successive differences are called higher-order crossings (HOC). Under the Gaussian assumption the sequence of expected HOC is monotone increasing and admits a spectral representation which establishes a clear connection between HOC and the spectrum. In particular the normalized number of axis-crossings (first HOC) tend to admit values at or near a dominant frequency in the spectrum. When the series is first lowpass filtered, the resulting normalized HOC tend to 'visit' true discrete frequencies on their way to the highest frequency. If the successive differences are replaced by successive summation, the resulting modified normalized HOC converge monotonically to the lowest frequency in the spectrum. Keywords: Dominant frequency; Highest frequency; Spectral; Gaussian; Monotone sequence; Mathematical filters; Reprints.

DESCRIPTORS: (U) *MATHEMATICAL FILTERS, *TIME SERIES ANALYSIS, DETECTION, FREQUENCY, HIGH FREQUENCY, LOW PASS FILTERS, REPRINTS, SPECTRA, GAUSSIAN QUADRATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 133 12/4

NORTHWESTERN UNIV EVANSTON IL DEPT OF MECHANICAL ENGINEERING

(U) Designing Stabilizing Controllers for Uncertain Systems Using the Riccati Equation Approach,

87 5P

PERSONAL AUTHORS: Schmitendorf, W. E.

CONTRACT NO. AFOSR-ISSA-85-00051, $NSF-ECS84-15591

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1117

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the American Control Conference, p502-505 1987.

ABSTRACT: (U) A useful technique for determining a linear feedback control law which stabilizes an uncertain system is the Riccati Equation approach. It considers systems with time varying uncertainty in the system matrix and obtain the constant feedback gains for the linear stabilizing controller in terms of the solution of a Riccati equation. This technique is extended to include problems with time varying uncertainty in the input connection matrix. Several examples are included to demonstrate the efficacy of this result. Keywords: Uncertain systems; Stability; Robust control; Linear control problems; Reprints.

DESCRIPTORS: (U) *RICCATI EQUATION, CONTROL, FEEDBACK, LINEAR SYSTEMS, REPRINTS, SOLUTIONS(GENERAL), TIME, CONTROL THEORY.

IDENTIFIERS: (U) Uncertainty, Robust procedures.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 132 12/1

PITTSBURGH UNIV PA INST FOR COMPUTATIONAL MATHEMATICS AND APPLICATIONS

(U) A Geometric Framework for the Numerical Study of Singular Points.

JUN 87 17P

PERSONAL AUTHORS: Fink, James P.; Rheinboldt, Werner C.

CONTRACT NO. AFOSR-84-0131

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1134

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Numerical Analysis, v24 n3 p618-633 Jun 87.

ABSTRACT: (U) While bifurcation theory has developed rapidly in recent years, there appears to be a need for a tighter framework for the numerical analysis of bifurcation problems. This paper presents such a mathematical framework for the numerical study of the bifurcation phenomena associated with a parameter-dependent equation F(z, lambda) = 0. The presentation draws from differential geometry and singularity theory and provides a basis for various numerical methods used to detect and compute certain types of bifurcation points. Keywords: Reprints; Differentiable manifolds; Singular points; Numerical bifurcation; Augmented equations.

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), *POINTS(MATHEMATICS), DIFFERENTIAL GEOMETRY, EQUATIONS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, REPRINTS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

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AD-A186 122 13/13

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) A Parallel Block Iterative Scheme Applied to Computations in Structural Analysis,

JUL 86 12P

PERSONAL AUTHORS: Plemmons, Robert J.

CONTRACT NO. AFOSR-83-0255

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1313

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Algebraic and Discrete Methods, v7 n3 p337-347 Jul 86.

ABSTRACT: (U) In this paper it is shown how a block cyclic successive overrelaxation direct-iterative method can be applied to the parallel solution of certain large-scale linear equality-con-strained quadratic programming problems. The scheme is similar in nature to those studied recently by de Pillis, Niethammer and Varga and by Markham, Neumann and Plemmons for solving large sparse least squares problems, It is based upon a partitioning strategy of the fundamental matrix into a block consistently ordered 2-cyclic form where the nonzero and eigenvalues of the Jacobi matrix are all pure imaginary. The method is shown to be globally convergence and convergence rates are established. Applications of the algorithms are discussed for large-scale structural analysis computations where it is shown how the algorithm can be adapted to the simultaneous computation of the system forces and the nodal displacements. Here, advantage can be taken of the special forms of the matrix involved. In particular, it is shown that much of the algorithm lends itself to efficient implementation of pipelined vector machines and on multiprocessors. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTATIONS, *EIGENVALUES, *STRUCTURAL ANALYSIS, CONVERGENCE, DISPLACEMENT, ITERATIONS, MACHINES, NODES, PARALLEL

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ORIENTATION, PARALLEL PROCESSING, RATES, SYNCHRONISM, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A186 122

AD-A186 121 12/4

INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

(U) Search Rearrangement Backtracking often Requires Exponential Time to Verify Unsatisfiability,

JUL 87 29P

PERSONAL AUTHORS: Franco, John

CONTRACT NO. AFOSR-84-0372

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-87-1153

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated 10 Dec 86.

ABSTRACT: (U) It is shown that any form of Search Rearrangement Backtracking (SRB) requires exponential time to verify the unsatisfiability of nearly all of a wide class of CNF boolean expressions. This result is based on an input model which generates r independant k-literal clauses from set of r boolean variables. We assume that k is fixed and n and r tend to infinity. The result holds if the limit as n approaches infinity of n/r(n) = lambda, is fixed and lambda>1n(2)/(1-2 to the -K power). SRB requires superpolynomial time nearly always if lambda is replaced by lambda(n) = o(n to the 1/1n 1n (n) power and the limit as n approaches infinity of lambda (n) = infinity (so the superpolynomial time result holds, for example if lambda (n) = (1n(n)) to the beta power where beta is any positive constant) These results apply to any form of the Davis-Putnam Procedure.

DESCRIPTORS: (U) *BOOLEAN ALGEBRA, *SEARCHING, *NONLINEAR PROGRAMMING, INPUT, VARIABLES, COMBINATORIAL ANALYSIS, PROBABILITY.

IDENTIFIERS: (U) Davis Putnam procedure, SRB(Search Rearrangement Backtracking), Trees(Mathematics).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 120 20/4

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Unsteady Stall Penetration Experiments at High Reynolds Number.

DESCRIPTIVE NOTE: Final rept. 14 Aug 84-14 Feb 87,

APR 87 204P

PERSONAL AUTHORS: Lorber, Peter F.; Carta, Franklin O.

REPORT NO. UTRC/R87-956939-3

CONTRACT NO. F49620-84-C-0082

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1202

UNCLASSIFIED REPORT

ABSTRACT: (U) An experiment was performed to examine the unsteady aerodynamics of stall penetration at constant pitch rate and high Reynolds number, in an attempt to more accurately model conditions during aircraft post-stall maneuvers and during helicopter high speed forward flight. The model spanned the 8 ft wind tunnel and consisted of a 17.3 in. chord wing with a Sikorsky SSC-A0Q airfoil section. Two forms of pitching motion were used: constant pitch rate ramps and sinusoidal oscillations. Ramp data were obtained for 36 test points at pitch rates between 0.001 and 0.020, Mach numbers between 0.2 and 0.4, and Reynolds numbers between 2 and 4 million. Sinusoidal data were obtained for an additional 9 conditions. The results demonstrate the influence of the leading edge stall vortex on the unsteady aerodynamic response during and after stall. The vortex-related unsteady increments to the lift, drag, and pitching moment increase with pitch rate; the maximum delta C sub L is 1.2 at A =0.02. Angular delays in stall events also increase with pitch rate. Vortex strength and propagation velocity were determined from pressures induced on the airfoil surface. The vortex is strengthened by increasing the pitch rate, and is weakened both by increasing the Mach number and by starting the motion close to the

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AD-A186 120 CONTINUED

steady-state stall angle. Propogation velocity increases linearly with pitch rate.

DESCRIPTORS: (U) *AERODYNAMIC CHARACTERISTICS, *REYNOLDS NUMBER, AIRCRAFT, AIRFOILS, ANGLES, FLIGHT MANEUVERS, HIGH RATE, LEADING EDGES, MACH NUMBER, MODELS, MOMENTS, PENETRATION, PITCH(MOTION), PROPAGATION, RAMPS, RATES, STALLING, STEADY STATE, STRENGTH(GENERAL), SURFACES, UNSTEADY FLOW, VELOCITY, VORTICES, WINGS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

AD-A186 120

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 105 11/2.1

PANAMETRICS INC WALTHAM MASS

(U) Absorption, Scattering, and Thermal Radiation by Conductive Fibers.

DESCRIPTIVE NOTE: Final rept. 16 May 84-15 Jan 87,

JUL 87

PERSONAL AUTHORS: Pedersen, N. E.; Waterman, P. C.; Pedersen, J. C.

CONTRACT NO. F49620-84-C-0045

MONITOR: AFOSR TR-87-1261

UNCLASSIFIED REPORT

ABSTRACT: (U) The present authors have studied the scattering of electromagnetic waves using variational method. Thus, that the work can be regarded as an extension of the work Tai and Cassedy and Fainberg to include both finite conductivity and arbitrary angel of incidence. Differential scattering patterns are then computed, along with the scattering, absorption and extinction. These cross sections are obtained by intergrating the normal component of the Poynting vector over the surface of the fiber, enabling us to avoid the integration over the far-field sphere usually employed to compute scattering. In addition, it is found that energy considerations are exactly satisfied: the extinction cross section, which by the optical theorem must equal the imaginary part of the forward amplitude, is identically equal to the sum of the absorption and scattering cross sections. This result is particularly valuable for those applications in which we study the scattering and absorption properties of the cloud of such fiber particles.

DESCRIPTORS: (U) *ABSORPTION, *CONDUCTIVITY, *ELECTROMAGNETIC RADIATION, *FIBERS, *SCATTERING CROSS SECTIONS, AMPLITUDE, CROSS SECTIONS, DIFFERENTIAL CROSS SECTIONS, ELECTROMAGNETIC SCATTERING, EXTINCTION, FAR FIELD, FORWARD AREAS, OPTICAL PROPERTIES, PARTICLES, PATTERNS, SCATTERING, SPHERES, SURFACES, THEOREMS, THERMAL RADIATION.

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AD-A186 105 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C4.

IAC NO. PL-051439

IAC DOCUMENT TYPE: PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)VARIATIONAL ANALYSIS, ELECTROMAGNETIC WAVES, THERMAL RADIATION EFFECTS, CONDUCTIVE FIBERS, GRAPHITE FIBERS, EMITTANCE, SCATTERING, WAVE PROPAGATION, FIBERS, DISPERSIONS, ZZ UNLIMITED.;

AD-A186 105

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 073 20/6

ARIZONA UNIV TUCSON COLL OF ENGINEERING AND MINES

(U) Feasibility Studies of Optical Processing of Image Bandwidth Compression Schemes.

DESCRIPTIVE NOTE: Final rept. 15 Mar 81-30 Sep 85,

MAY 87 213P

PERSONAL AUTHORS: Hunt, B. R.

CONTRACT NO. AFOSR-81-0170

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-87-0768

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Supersedes rept. AD-A181 720.

ABSTRACT: (U) The two research activities are included as two separate divisions of this research report. The research activities are as follows: 1. Adaptive Recursive Interpolated DPCM for image data compression (ARIDPCM). A consistent theme in the search supported under Grant Number AFOSR under Grant AFOSR-81-0170 has been novel methods of image data compression that are suitable for implementation by optical processing. Initial investigation led to the IDPCM method of image data compression. 2. Deblurring images through turbulent atmosphere. A common problem in astronomy is the imaging of astronomical fluctuations of the atmosphere. The microscale fluctuations limit the resolution of any object by ground-based telescope, the phenomenon of stars twinkling being the most commonly observed form of this degradation. This problem also has military significance in limiting the ground-based observation of satellites in earth orbit. As concerns about SDI arise, the observation of Soviet Satellites becomes more important, and this observation is limited by atmospheric turbulence.

DESCRIPTORS: (U) *COMPRESSION, *IMAGES, *OPTICAL PROCESSING, ARTIFICIAL SATELLITES, ASTRONOMY, ATMOSPHERES, ATMOSPHERIC MOTION, BANDWIDTH, DATA COMPRESSION,

AD-A186 073 CONTINUED

DEGRADATION, EARTH ORBITS, FEASIBILITY STUDIES, FOCUSING, GROUND LEVEL, LIMITATIONS, OBSERVATION, STARS, TELESCOPES, TURBULENCE, USSR, VARIATIONS.

AD-A186 073

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 070 12/3 12/9

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) Random Field Identification from a Sample: 1. The Independent Case.

DESCRIPTIVE NOTE: Final rept.,

NOV 85 24P

PERSONAL AUTHORS: Rosenblatt-Roth, Millu

REPORT NO. CAR-TR-166, CS-TR-1583

CONTRACT NO. F49620-85-K-0009

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-87-0965

UNCLASSIFIED REPORT

ABSTRACT: (U) Given a random field belonging to some specific class, and given a data sample generated by the random field, the author considers the problem of finding a field of the given class that approximates the field that generated the sample. This paper derives a solution to this problem for the simple case of a field consisting of independent random variables. Subsequent papers will treat other types of fields, e.g., having Markov dependencies. Numerical examples are given, showing that good approximations can be obtained based on relatively small sample sizes. In particular, this approach can be used to find random field models that generate given samples of image texture, and so can be applied to texture classification or segmentation. Keywords: Stationary; Random variables; Markov Chains. (Author)

DESCRIPTORS: (U) *CLASSIFICATION, *IMAGE PROCESSING, *TEXTURE, IDENTIFICATION, IMAGES, MARKOV PROCESSES, SEGMENTED, PROBABILITY, RANDOM VARIABLES, SAMPLING.

AD-A186 070

AD-A186 067 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Generation of Hexamethyl-1,4-Disilabenzene and Its Novel Thermal Chemistry,

87 12P

PERSONAL AUTHORS: Welsh, Kevin M.; Rich, Jonathan D.; West, Robert; Michl, Josef

CONTRACT NO. F49520-86-C-0010, $NSF-CHE83-18820

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1296

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v325 p105-115 1987.

ABSTRACT: (U) Reaction of a mixture of cis-and trans-1,4-dichlorohexamethyl-1,4-disilacyclohexa-2-5-diene (7) and dilithioanthracenide yields the 9,10-bridged-anthracene adduct of the disilacyclohexadiene, 2. Photolysis or thermolysis of yields transient hexamethyl-1,-4-disilabenzene (1), which is trapped by alkynes to give 1, 4-dislabarrelenes 8a, 8b, by methanol to give 1-methoxy-4-hydrohexamethyl-1-1,4- disilacyclohexa-2, 5-diene (9), and by oxygen to give 1,2,3,4,5,6-hexamethyl-1,4-disila-7-oxa2.2.1 bicyclohepta-2,5-diene (14). Thermolysis of cis-1,4-dihydrohexamethyl - 1,4-disila-cyciohexa-2,5-diene (6) also produces 1 which rearranges at higher temperatures to 2,3,4,5,6-pentamethyl-1,4-disilabicyclo2.2,1 hepta-2,5-diene (10) and 1,1,3,4-tetramethyl-2,5-dimethylene-1-sialcyclopent-3-ene (11). Mechanisms are proposed to account for the observed reactions.

DESCRIPTORS: (U) *CARBINOLS, *BENZENE COMPOUNDS, ALKYNES, CHEMISTRY, HIGH TEMPERATURE, OXYGEN, PHOTOLYSIS, THERMAL PROPERTIES, TRAPPING(CHARGED PARTICLES), METHYL RADICALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A186 067

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 073 20/6

ARIZONA UNIV TUCSON COLL OF ENGINEERING AND MINES

(U) Feasibility Studies of Optical Processing of Image Bandwidth Compression Schemes.

DESCRIPTIVE NOTE: Final rept. 15 Mar 81-30 Sep 85,

MAY 87 213P

PERSONAL AUTHORS: Hunt, B. R.

CONTRACT NO. AFOSR-81-0170

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-87-0768

UNCLASSIFIED REPORT .

SUPPLEMENTARY NOTE: Supersedes rept. AD-A181 720.

ABSTRACT: (U) The two research activities are included as two separate divisions of this research report. The research activities are as follows: 1. Adaptive Recursive Interpolated DPCM for image data compression (ARIDPCM). A consistent theme in the search supported under Grant Number AFOSR under Grant AFOSR-81-0170 has been novel methods of image data compression that are suitable for implementation by optical processing. Initial investigation led to the IDPCM method of image data compression. 2. Deblurring images through turbulent atmosphere. A common problem in astronomy is the imaging of astronomical fluctuations of the atmosphere. The microscale fluctuations limit the resolution of any object by ground-based telescope, the phenomenon of stars twinkling being the most commonly observed form of this degradation. This problem also has military significance in limiting the ground-based observation of satellites in earth orbit. As concerns about SDI arise, the observation of Soviet Satellites becomes more important, and this observation is limited by atmospheric turbulence.

DESCRIPTORS: (U) *COMPRESSION, *IMAGES, *OPTICAL PROCESSING, ARTIFICIAL SATELLITES, ASTRONOMY, ATMOSPHERES, ATMOSPHERIC MOTION, BANDWIDTH, DATA COMPRESSION,

AD-A186 073

AD-A186 073 CONTINUED

DEGRADATION, EARTH ORBITS, FEASIBILITY STUDIES, FOCUSING, GROUND LEVEL, LIMITATIONS, OBSERVATION, STARS, TELESCOPES, TURBULENCE, USSR, VARIATIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 070 12/3 12/9

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) Random Field Identification from a Sample: 1. The Independent Case.

DESCRIPTIVE NOTE: Final rept.,

NOV 85 24P

PERSONAL AUTHORS: Rosenblatt-Roth, Millu

REPORT NO. CAR-TR-166, CS-TR-1583

CONTRACT NO. F49620-85-K-0009

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-87-0965

UNCLASSIFIED REPORT

ABSTRACT: (U) Given a random field belonging to some specific class, and given a data sample generated by the random field, the author considers the problem of finding a field of the given class that approximates the field that generated the sample. This paper derives a solution to this problem for the simple case of a field consisting of independent random variables. Subsequent papers will treat other types of fields, e.g., having Markov dependencies. Numerical examples are given, showing that good approximations can be obtained based on relatively small sample sizes. In particular, this approach can be used to find random field models that generate given samples of image texture, and so can be applied to texture classification or segmentation. Keywords: Stationary; Random variables; Markov Chains. (Author)

DESCRIPTORS: (U) *CLASSIFICATION, *IMAGE PROCESSING, *TEXTURE, IDENTIFICATION, IMAGES, MARKOV PROCESSES, SEGMENTED, PROBABILITY, RANDOM VARIABLES, SAMPLING.

AD-A186 070

AD-A186 067 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Generation of Hexamethyl-1,4-Disilabenzene and Its Novel Thermal Chemistry,

87 12P

PERSONAL AUTHORS: Welsh, Kevin M.; Rich, Jonathan D.; West, Robert; Michl, Josef

CONTRACT NO. F49620-86-C-0010, $NSF-CHE83-18820

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1296

UNCLASSIFIED REPORT

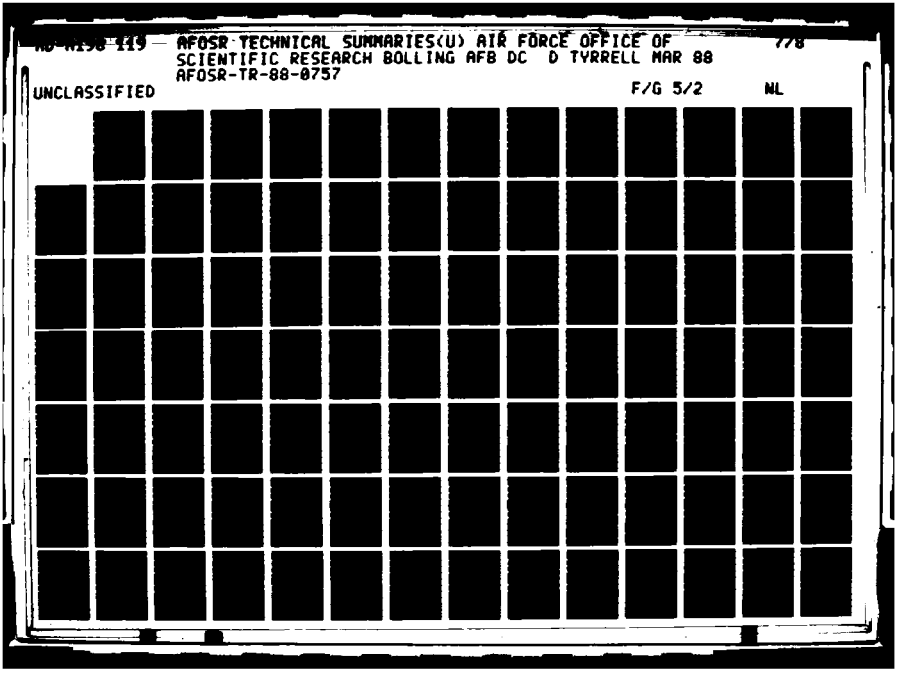
SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v325 p105-115 1987.

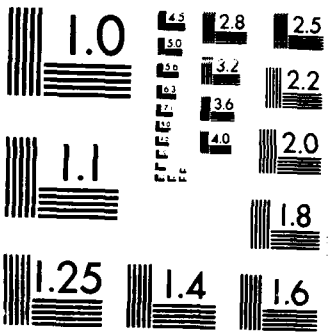
ABSTRACT: (U) Reaction of a mixture of cis-and trans-1,4-dichlorohexamethyl-1,4-disilacyclohexa-2-5-diene (7) and dilithioanthracenide yields the 9,10-bridged-anthracene adduct of the disilacyclohexadiene, 2. Photolysis or thermolysis of yields transient hexamethyl-1,-4-disilabenzene (1), which is trapped by alkynes to give 1, 4-dislabarrelenes 8a, 8b, by methanol to give 1-methoxy-4-hydrohexamethyl-1-1,4- disilacyclohexa-2, 5-diene (9), and by oxygen to give 1,2,3,4,5,6-hexamethyl-1,4-disila-7-oxa2.2.1 bicyclohepta-2,5-diene (14). Thermolysis of cis-1,4-dihydrohexamethyl - 1,4-disila-cyclohexa-2,5-diene (6) also produces 1 which rearranges at higher temperatures to 2,3,4,5,6-pentamethyl-1,4-disilabicyclo2.2,1 hepta-2,5-diene (10) and 1,1,3,4-tetramethyl-2,5-dimethylene-1-sialcyclopent-3-ene (11). Mechanisms are proposed to account for the observed reactions.

DESCRIPTORS: (U) *CARBINOLS, *BENZENE COMPOUNDS, ALKYNES, CHEMISTRY, HIGH TEMPERATURE, OXYGEN, PHOTOLYSIS, THERMAL PROPERTIES, TRAPPING(CHARGED PARTICLES), METHYL RADICALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A186 067


AD-A196 119 AFOSR TECHNICAL SUMMARIES(U) AIR FORCE OFFICE OF 1/8
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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 065 7/4 20/2

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Interfaces, Superlattices, and Thin Films Symposium Held in Boston, Massachusetts on December 1-6, 1986. Material Research Society Symposia Proceedings. Volume 77.

DESCRIPTIVE NOTE: Annual rept.,

87 835P

PERSONAL AUTHORS: Dow, John D.; Schuller, Ivan K.

CONTRACT NO. AFOSR-85-0355

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR
TR-87-0896

UNCLASSIFIED REPORT

Availability: Material Research Society, Pittsburgh, PA 15237. HC $55.00. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) Partial Contents: Scanning Tunneling Microscopy and Spectroscopy of Semiconductor Surfaces; Application of Scanning Tunneling Microscopy to the Study of Metals: Spectroscopy and Topography; Elastic Properties of Superlattices; Photo Effects in Doping Modulated Amorphous Semiconductors; Doping Effects in GaAs/AlGaAs Superlattices; Phase Transitions in the Picosecond Time Domain; Correlations and Ordering in (GaSb) (1-xGe2x) Alloys; Electron Localization and the Aharonov-Bohm Effect in Two-dimensional Metal Systems: Superconducting Metallic Superlattices; Molecular-dynamics Simulation of Thin Film Growth; Exafs Studies of Semiconductors; Exploring Magnetic Properties of Epitaxial Films and Superlattices; Hot Electron Relaxation in Quantum Wells; Characterization of Epitaxial Films by Grazing-Incidence X-ray Diffraction.

DESCRIPTORS: (U) *ALLOYS, *DOPING, *EPITAXIAL GROWTH, *FILMS, *QUANTUM ELECTRONICS, *SEMICONDUCTORS, *THIN FILMS, AMORPHOUS MATERIALS, ELECTRONS, FORTIFICATIONS, GRAZING, GROWTH(GENERAL), MAGNETIC PROPERTIES,

AD-A186 065

AD-A186 065 CONTINUED

MASSACHUSETTS, METALS, MICROSCOPY, MODULATION, PHASE TRANSFORMATIONS, PHOTOGRAPHS, RELAXATION, SCANNING, SPECTROSCOPY, SURFACES, SYMPOSIA, TIME DOMAIN, TOPOGRAPHY, TUNNELING, TWO DIMENSIONAL, X RAY DIFFRACTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B2.

AD-A186 065

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 063 20/2 17/5.1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Materials for Infrared Detectors and Sources, Interfaces, Superlattices and Thin Films Symposium Held in Boston, Massachusetts on December 1-5, 1986. Material Research Society Symposia Proceedings. Volume 90.

DESCRIPTIVE NOTE: Annual rept.,

87 510P

PERSONAL AUTHORS: Farrow, R. F.; Schetzina, J. F.; Cheung, J. T.

CONTRACT NO. AFOSR-85-0355, $DAAL03-87-G-0005

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR, ARO TR-87-1625, 24466.1-EL-CF

UNCLASSIFIED REPORT

Availability: Material Research Society, Pittsburgh, PA 15237. HC $37.00. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) This book contains most of the papers presented at the symposium: Material s for Infrared Detectors and Sources held in Boston, Massachusetts, December 1-5, 1986. This symposium brought together the leading groups from the USA, Europe and Japan working on the preparation and characterization of materials for infrared detectors and sources. Much of the activity in this field is driven by the need for focal-plane array imagers operating in the medium (3-5 micron) and long (8-14 micron) wavelength atmospheric transmission windows. In addition there is now a growing interest in the preparation and exploration of detector and source materials for fiber-optic communications at wavelengths beyond 1.5 microns. The objectives of the symposium were threefold: firstly, to review progress in the key areas of bulk and epitaxial growth technologies for preparation of infrared materials; secondly, to review techniques for characterization of infrared materials; and thirdly, to evaluate the potential of novel materials and structures

AD-A186 063

AD-A186 063 CONTINUED

for infrared detectors as well as new epitaxial technologies for preparation of detector structures.

DESCRIPTORS: (U) *INFRARED DETECTORS, *INFRARED OPTICAL MATERIALS, ANTENNA ARRAYS, ATMOSPHERES, ATMOSPHERIC WINDOWS, DETECTORS, EPITAXIAL GROWTH, EUROPE, FIBER OPTICS, FOCUSING, FREQUENCY, IMAGES, JAPAN, MASSACHUSETTS, OPTICAL COMMUNICATIONS, PREPARATION, SOURCES, STRUCTURES, SYMPOSIA, THIN FILMS, TRANSMITTANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 056 17/4 12/7

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Modified Capon Beamformer for Coherent Interference.

DEC 86 6P

PERSONAL AUTHORS: Reddy, V. U.; Shan, T. J.; Kailath, T.

CONTRACT NO. DAAG29-83-K-0028, N00014-85-K-0550

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1007

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annual Asiloman Conference on Signals, Systems and Computers (20th), p1-5 Dec 86.

ABSTRACT: (U) In this paper, we propose a modified Capon beamformer to give improved performance in coherent jamming environments. First, we briefly discuss the interference rejection and signal cancellation properties of the Capon beamformer in the presence of correlated interference, with a view to motivating the need to decorrelate the desired source signal from the interferences. We then introduce subarray covariance averaging techniques for decorrelating the impinging sources, and present an optimal weighting scheme that ensures perfect decorrelation of the sources for any given number of subarrays. Computer simulations are included to support our analysis.

DESCRIPTORS: (U) *CANCELLATION, *COMPUTERIZED SIMULATION, *JAMMING, BEAM FORMING, COHERENCE, CORRELATION TECHNIQUES, INTERFERENCE, OPTIMIZATION, REJECTION, SIGNALS, SOURCES, WEIGHTING FUNCTIONS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A186 052 12/3

OAK RIDGE NATIONAL LAB TN

(U) Orthogonal Reduction of Sparse Matrices to Upper Triangular Form Using Householder Transformations.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87.

APR 86 14P

PERSONAL AUTHORS: George, Alan; Ng, Esmond

CONTRACT NO. DE-AC05-84OR21400, $AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR. AFOSR TR-87-1213

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Scientific and Statistical Computing, v7 n2 p460-472 Apr 86.

ABSTRACT: (U) In this reprint we the authors consider the problem of predicting where fill-in occurs in the orthogonal decomposition of sparse matrices using Householder transformations. It is shown that a static data structure can be used throughout the numerical computation, and that the Householder transformation can be saved explicitly in a compact format.

DESCRIPTORS: (U) *SPARSE MATRIX, COMPUTATIONS, DATA BASES, FORMATS, NUMERICAL METHODS AND PROCEDURES, ORTHOGONALITY, REDUCTION, REPRINTS, STATICS, DECOMPOSITION, TRANSFORMATIONS(MATHEMATICS), MATHEMATICAL PREDICTION.

IDENTIFIERS: (U) Householder transformations, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY

AD-A186 051 12/5

OAK RIDGE NATIONAL LAB TN

(U) Parallel Cholesky Factorization on a Shared-Memory Multiprocessor.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87, 86 24P

PERSONAL AUTHORS: George, Alan; Heath, Michael T.; Liu, Joseph

CONTRACT NO. DE-AC05-840R21400, $AFOSR-87-0013

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1212

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear Algebra and Its Applications, v77 p165-187 1986.

ABSTRACT: (U) A parallel algorithm is developed for Cholesky factorization on a shared-memory multiprocessor. The algorithm is based on self-scheduling of a pool of tasks. The subtasks in several variants of the basic elimination algorithm are analyzed for potential concurrency in terms of precedence relations, work profiles, and processor utilization. This analysis is supported by simulation results. The most promising variant, which we call column-Cholesky, is identified and implemented for the Denelcor HEP multiprocessor. Experimental results are given for this machine. Keywords: Reprints; Charts; Statistical data; Self-scheduling loops; Experimental data. (Author)

DESCRIPTORS: (U) *PARALLEL PROCESSING, *MULTIPROCESSORS, ALGORITHMS, ELIMINATION, EXPERIMENTAL DATA, SCHEDULING, SCHEDULING, GRAPHS, PROCESSING EQUIPMENT, PROFILES, REPRINTS, SIMULATION, STATISTICAL DATA, UTILIZATION, VARIATIONS.

IDENTIFIERS: (U) Cholesky factorization, PE61102F, WUAFOSR2304A3.

AD-A186 051

SEARCH CONTROL NO. EVJ50D

AD-A186 050 17/11 12/3

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Directional Signal Separation by Adaptive Arrays with a Root-Tracking Algorithm,

APR 87 5P

PERSONAL AUTHORS: Shan, T. J.; Kailath, T.

CONTRACT NO. DAAG29-81-K-0057, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1008

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Conference on Acoustic and Signal Processing, p2288-2291 Apr 87.

ABSTRACT: (U) In this paper we introduce a new adaptive array able to separate superimposed directional signals without requiring any a priori information. The new adaptive array combines bearing estimation and adaptive array processing. The suggested adaptive array utilizes a root-tracking algorithm that is based on Pisarenko's harmonic retrieval method which can handle correlated array input signals. (Reprints)

DESCRIPTORS: (U) *ADAPTIVE SYSTEMS, *ARRAYS, *ESTIMATES, *PROCESSING, BEARING(DIRECTION), DIRECTIONAL, HARMONICS, INFORMATION RETRIEVAL, INPUT, REPRINTS, SEPARATION, SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A186 050

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 043 12/3 5/5

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Predicting Magazine Audiences with a Loglinear Model.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 28P

PERSONAL AUTHORS: Danaher, Peter J.

REPORT NO. FSU-TR-M758

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1082

UNCLASSIFIED REPORT

ABSTRACT: (U) A loglinear model for predicting magazine exposure distributions is developed and its' parameters are estimated by using the maximum likelihood technique. The accuracy of the loglinear and a Dirichlet-multinomial model are compared using 1985 AGB: McNair data. The result show that the loglinear model has significantly smaller prediction errors than the Dirichlet-multinomial model. A simple algorithm for optimal media scheduling is given. Keywords: Advertising; Statistical analysis; Efficiency. (Author)

DESCRIPTORS: (U) *EXPOSURE(GENERAL), *MATHEMATICAL PREDICTION, *MAXIMUM LIKELIHOOD ESTIMATION, ACCURACY, ALGORITHMS, DISTRIBUTION, ERRORS, OPTIMIZATION, SCHEDULING, STATISTICAL ANALYSIS.

IDENTIFIERS: (U) *Advertising, PE61102F, WUAFOSR2304A5.

AD-A186 043

AD-A186 042 6/1 12/3

COLUMBIA UNIV NEW YORK

(U) Linear Bayes Estimators of the Potency Curve in Bioassay.

DESCRIPTIVE NOTE: Technical rept.,

84 25P

PERSONAL AUTHORS: Kuo, Lynn

CONTRACT NO. AFOSR-87-0072

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1083

UNCLASSIFIED REPORT

ABSTRACT: (U) The Bayesian nonparametric approach to estimating the tolerance distribution in quantal bioassay has received some attention. The computational difficulty in evaluating these Bayes estimators has hindered their applications. This paper explores the linear Bayes approach to the bioassay problem. These linear Bayes estimators can be computed easily by using statistical software which has the capability of inverting a matrix. Let us state the quantal bioassay problem as follows: The experimenter intends to test the potency of a stimulus by giving subjects injections of the stimulus at different levels; namely, he chooses L dosage levels, t sub 1,....., t sub L, and treats n sub 1,....,n sub L subjects at these levels respectively. Each subject possesses a fixed tolerance level. If a stimulus exceeds a subject's tolerance level, the subject responds positively. If not, there is no response. Therefore we observe the number of positive responses at each level. These numbers are denoted by k sub 1,...,k sub 1. The potency curve F is the distribution of tolerance levels; i.e. F is defined by the probability F(t) of getting a positive response to a dosage at level t for all t. The objective of this article is to make inferences about the potency curve F. Keywords: Ferguson's Dirichlet process.

DESCRIPTORS: (U) *BAYES THEOREM, *NONPARAMETRIC

AD-A186 042

AD-A186 042 CONTINUED

STATISTICS, *BIOASSAY, COMPUTATIONS, COMPUTER PROGRAMS, DIRICHLET INTEGRAL, DISTRIBUTION, DOSAGE, GRAPHS, INJECTION, INJECTIONS(MEDICINE), LEVEL(QUANTITY), POTENCY, RESPONSE, STATISTICS, STIMULI, TOLERANCE, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 042

AD-A186 041 25/5

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) A Multi User Random Access Communication System for Users with Different Priorities.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 86,

FEB 87 33P

PERSONAL AUTHORS: Kazakos, D.; Stavrakakis, I.

REPORT NO. UVA/525656/EE87/102

CONTRACT NO. AFOSR-82-0030

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1047

UNCLASSIFIED REPORT

ABSTRACT: (U) A multi user random access communication system with a population of two classes of users is considered. It is assumed that packets generated by users from different classes have different priorities. Fast moving users in a mobile communication system, or high priority users in a static environment, might be members of the high priority class. A binary feedback collision resolution algorithm is developed and both throughput and delay analysis are performed. Analytical results show that for the operation region of practical interest, the high priority class experiences significantly shorter delays, compared to the low priority one which maintains good delay characteristics. (Author)

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *DELAY, *MOTION, *PACKETS, MOBILE, OPERATION, POPULATION, STATICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 041

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 040 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) An Algebraic Approach to Time Scale Analysis of Singularly Perturbed Linear Systems.

SEP 86 55P

PERSONAL AUTHORS: Lou, Xi-Cheng; Willsky, Alan S.; Verghese, George C.

REPORT NO. LIDS-P-1604

CONTRACT NO. AFOSR-82-0258

MONITOR: AFOSR TR-87-1217

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper develops an algebraic approach to the multiple time scale analysis of perturbed linear systems based on the examination of the Smith form of the system matrix viewed as a matrix over a ring of functions in the perturbation parameter. This perspective allows us to obtain a strengthened version of the results of an earlier work and to provide a bridge between these complex but general results and previous explicit, conceptually simple, but somewhat restrictive results. In addition, the authors' algebraic framework allows them to investigate a variety of other problems. In this paper they study the problem of developing valid time scale decompositions in cases in which weak damping terms discarded in the approaches in earlier works must be retained. Also, this approach exposes the role of the invariant factors of the system matrix in determining its time scales. This leads naturally to the problem of time scale modification, i.e., invariant factor placement, via state feedback. A result along these lines is presented.

DESCRIPTORS: (U) *ALGEBRA, *LINEAR SYSTEMS, DAMPING, DECOMPOSITION, FEEDBACK, INVARIANCE, LOW STRENGTH, MODIFICATION, PERTURBATIONS, RINGS, SCALE, TIME, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) *Time scale analysis.

AD-A186 039 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) A New Method of Estimation in a Moving Average Model of Order One.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 18P

PERSONAL AUTHORS: Chapeh, H. A.; Rao, M. B.

REPORT NO. TR-86-46

CONTRACT NO. F49620-85-C-0008, N00014-85-K-0292

MONITOR: AFOSR TR-87-1091

UNCLASSIFIED REPORT

ABSTRACT: (U) The exact likelihood of the data coming from a moving average model of order is complicated. In this paper, the authors propose a method of estimation of the parameters of a moving average model of order one based on the approximate likelihood of the data and on the simulation of a pair of random variables. Some comparisons were made of this method with some well known methods for moderate sample sizes. A computer program is appended which is helpful in using this methods. Keywords: Time series; Analysis; Computerized simulation; Multivariate analysis.

DESCRIPTORS: (U) *ESTIMATES, *MATHEMATICAL MODELS, COMPUTER PROGRAMS, COMPUTERIZED SIMULATION, MULTIVARIATE ANALYSIS, RANDOM VARIABLES, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) Moving average models.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 038 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Some New Approaches to Multivariate Probability Distributions.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 38P

PERSONAL AUTHORS: Shanbhag, D. N.; Kotz, S.

REPORT NO. TR-86-44

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1094

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper extends and generalizes to the multivariate set-up earlier investigations related to expected remaining life functions and general hazard measures including representations and stability theorems for arbitrary probability distributions in terms of these concepts. (Author)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *PROBABILITY DISTRIBUTION FUNCTIONS, HAZARDS, MEASUREMENT, RANDOM VARIABLES, CONVERGENCE, STABILITY, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 038

AD-A186 037 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Necessary and Sufficient Conditions for the Convergence of Integrated and Mean-Integrated r-th Order Error of Histogram Density Estimates.

DESCRIPTIVE NOTE: Technical rept.,

APR 87 17P

PERSONAL AUTHORS: Chen, X. R.; Zhoa, L. C.

REPORT NO. TR-87-07

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1126

UNCLASSIFIED REPORT

ABSTRACT: (U) Suppose that X sub 1,...,X sub n are iid. samples drawn from a d-dimensional population with density function f. Let f(x) sub n = f sub n sub (x;X sub 1,....,X sub n) be an estimator of f(x). The Integrated Square Error (ISE) and Mean Integrated Square Error (MISE) of f sub n are important and widely used criteria in evaluating the performance of an estimator f sub n. Quite a lot of works appeared in the statistical literature dealing with the asymptotic properties of them, for various types of estimators, such as kernel estimator, orthogonal series estimator, nearest neighbor estimator etc. This paper the authors describe the necessary and sufficient conditions for the histogram estimator.

DESCRIPTORS: (U) *HISTOGRAMS, *CONVERGENCE, *PROBABILITY DENSITY FUNCTIONS, DENSITY, ERRORS, ESTIMATES, KERNEL FUNCTIONS, MEAN, ORTHOGONALITY.

IDENTIFIERS: (U) PE61102F, WUAFOS2304A5.

AD-A186 037

AD-A186 036 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Test of Linearity in General Regression Models.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 32P

PERSONAL AUTHORS: Chen, X. R.; Krishnaiah, P. R.

REPORT NO. TR-86-49

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1093

UNCLASSIFIED REPORT

ABSTRACT: (U) Linear regression models are widely used in statistical analysis of experimental and observational data. Usually the linearity of the model is merely an assumption and cannot be taken for granted. In some planned experiments, repeated measurements on the dependent variable Y can be taken while the independent variable X is held fixed. In such cases standard analysis-of-variance technique can be employed to generate a test for linearity. In many applications, however, the independent variable is observed simultaneously with Y. That is to say, X, as well as Y, is a random variable. Under such circumstances the usual method for testing linearity cannot supply. This paper studies this problem in large-sample context. The authors propose a method to test the linearity hypothesis based on a grouping of the data. The critical value of test-statistic is determined so that the test has a prescribed lever of significant alpha asymptotically as the sample size tends to infinity. The consistency of the test is established, and the asymptotic power is calculated when the distance (in some sense) between the true regression function and the space of linear functions tends to zero in some specific rate.

DESCRIPTORS: (U) *LINEAR REGRESSION ANALYSIS, *LINEARITY, *MATHEMATICAL MODELS, *MODELS, *STATISTICAL TESTS,

AD-A186 036

AD-A186 036 CONTINUED

ASYMPTOTIC SERIES, CONSISTENCY, HYPOTHESES, MULTIVARIATE ANALYSIS, RATES, REGRESSION ANALYSIS, STATISTICAL ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 035 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Robust Optimum Invariant Tests in One-Way Unbalanced and Two-Way Balanced Models.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 30P

PERSONAL AUTHORS: Das, Rita; Sinha, Bimal K.

REPORT NO. TR-86-19

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1341

UNCLASSIFIED REPORT

ABSTRACT: (U) In one-way random effects unbalanced model the locally best invariant test for the equality of the treatment effects is derived. Surprisingly, this is different from the widely used familiar F-test. In the balanced case, however the two tests coincide and represent the uniformly most powerful invariant tests. For two-way random effects and mixed effects balanced models, the uniformly most powerful invariant test for the equality of the treatment effects is derived both with and without interaction, and shown to be equivalent to the usual F-tests under fixed effects models. The optimum invariant tests derived here are shown not to depend on the assumption of normality. Different aspects of null, nonnull and optimality robustness of these tests (Kariya and Sinha, Annals of Statistics, 1985) are studied. In the unbalanced two-way models however unlike in the fixed effects model providing a UMPI test, both random and mixed effects models present a difficulty which is pointed out. Keywords: Multivariate analysis; Analysis of variance.

DESCRIPTORS: (U) *ANALYSIS OF VARIANCE, *STATISTICAL TESTS, INVARIANCE, MIXING, MULTIVARIATE ANALYSIS, NORMALITY, MATHEMATICAL MODELS.

AD-A186 035

AD-A186 035 CONTINUED

IDENTIFIERS: (U) REPRESENTATION THEOREMS, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 034 12/3 12/2

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Rate of Convergence of Equivariation Linear Prediction Estimates of the Number of Signals and Frequencies of Multiple Sinusoids.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 14P

PERSONAL AUTHORS: Bai, Z. D.; Krishnaiah, P. R.; Zhao, L. C.

REPORT NO. TR-86-38

CONTRACT NO. F49620-85-C-0008, N00014-85-K-0292

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1018

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors investigated the rates of convergence of their estimates of frequencies and the number of signals under a signal processing model with multiple sinusoids. Keywords include: Estimation, Exponential Bounds, Frequencies, Number of Signals, Rate of Convergence, and Signal Processing.

DESCRIPTORS: (U) *CONVERGENCE, *ESTIMATES, *MODELS, *PREDICTIONS, *SIGNAL PROCESSING, FREQUENCY, LINEAR SYSTEMS, RATES, SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 034

AD-A186 033 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strategies of Data Analysis.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 22P

PERSONAL AUTHORS: Rao, C. R.

REPORT NO. TR-87-14

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1088

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of statistical analysis is 'to extract all the information from observed data'. The recorded data may have some detects such as recording errors and outliers and the first task of a statistician is to scrutinize or cross-examine the data for possible defects and understand its special features. The next step is the specification of a suitable stochastic model for the data using prior information and cross-validation techniques. On the basis of a chosen model, inferential analysis is made, which comprises of estimation of unknown parameters, tests of hypotheses, prediction of future observations and decision making. Examining data under different possible models is suggested as more informative than using robust procedures to safeguard against possible alternative models. Finally data analysis must also provide information for raising new questions and planning future investigations. Some aspects of data analysis as outlined above are illustrated through examples.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, DATA PROCESSING, DECISION MAKING, ERRORS, HYPOTHESES, MATHEMATICAL MODELS, STOCHASTIC PROCESSES, STRATEGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 033

DTIC REPORT BIBLIOGRAPHY

AD-A186 032 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Variable Selection in Logistic Regression.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 20P

PERSONAL AUTHORS: Bai, Z. D.; Krishnaiah, P. R.; Zhao, L. C.

REPORT NO. TR-87-23

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1074

UNCLASSIFIED REPORT

ABSTRACT: (U) In many situations, we are interested in selection of important variables which are adequate for prediction under a logistic regression model. In this paper, some selection procedures based on the information theoretic criteria are proposed, and these procedures are proved to be strongly consistent. Keywords: Maximum likelihood estimation; Multivariate analysis; Asymptotic expansion.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, *VARIABLES, ASYMPTOTIC SERIES, INFORMATION THEORY, LOGISTICS, MATHEMATICAL MODELS, MAXIMUM LIKELIHOOD ESTIMATION, SELECTION, MULTIVARIATE ANALYSIS, MATHEMATICAL PREDICTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 032

SEARCH CONTROL NO. EVJ50D

AD-A186 031 17/11 12/3 12/9

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Direction of Arrival Estimation.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87

PERSONAL AUTHORS: Bai, Z. D.; Krishnaiah, P. R.; Zhao, L. C.

REPORT NO. TR-87-12

CONTRACT NO. F49620-85-C-0008, N00014-85-K-0292

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1110

UNCLASSIFIED REPORT

ABSTRACT: (U) The estimation of arrival direction is an important task in signal processing and has recently received considerable attention in the literature. In this paper, the authors proposed a method to estimate the direction of arrival and proved the strong consistency of the estimates for both cases in presence of white noise and colored noise. Keywords: Algorithms; Signal processing; Multivariate analysis.

DESCRIPTORS: (U) *ARRIVAL, *ESTIMATES, *SIGNAL PROCESSING, *WHITE NOISE, ALGORITHMS, CONSISTENCY, MULTIVARIATE ANALYSIS, NOISE, DIRECTION FINDING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 031

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 030 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Detecting and Interval Estimation About a Slope Change Point.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 30P

PERSONAL AUTHORS: Krishnaiah, P. R.; Miao, B. Q.

REPORT NO. TR-87-11

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0974

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors consider the problem of change points using Gaussian process. The distribution of the statistic to estimate a change point constructed in this paper can be approximated by the first type of extrimal distribution. Based on this, detection and interval estimation of a change point in various situations are discussed. Keywords: Variance; Heuristic methods; Asymptotic normality.

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, *INTERVALS, *SLOPE, ASYMPTOTIC NORMALITY, DETECTION, ESTIMATES, HEURISTIC METHODS, WHITE NOISE, BROWNIAN MOTION, MULTIVARIATE ANALYSIS, APPROXIMATION(MATHEMATICS).

IDENTIFIERS: (U) *Change points, PE61102F, WUAFOSR2304A5.

AD-A186 030

AD-A186 029 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Nonparametric Estimation of the Generalized Variance.

DESCRIPTIVE NOTE: Technical rept.,

NOV 86 15P

PERSONAL AUTHORS: Sinha, Bimal K.; Sen, Pranab K.

REPORT NO. TR-86-36

CONTRACT NO. F49620-85-C-0008, N00014-83-K-0387

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1019

UNCLASSIFIED REPORT

ABSTRACT: (U) For multivariate distributions with finite second order moments, a nonparametric symmetric, unbiased estimator of the generalized variance is considered, and it is shown to be (nonparametric) optimal for the class of distributions having finite fourth order moments. A jackknifed version of the sample generalized variance is also considered as a contender; it is computationally more convenient and asymptotically equivalent to the former. It is also shown that the second estimator performs quite well (in large sample) relative to the optimal normal theory estimators under several loss functions. (Keywords: kernels; U-statistics; von mises' functionals).

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, LOSSES, MOMENTS, MULTIVARIATE ANALYSIS DISTRIBUTION FUNCTIONS, OPTIMIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 029

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 028 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Least Squares Estimator in Moving Average Models of Order One.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 13P

PERSONAL AUTHORS: Chapeh, H. A.; Rao, M. B.

REPORT NO. TR-86-45

CONTRACT NO. F49620-85-C-0008, N00014-85-K-0292

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1015

UNCLASSIFIED REPORT

ABSTRACT: (U) A simple expression is derived in this paper for the error sum of squares in the context of moving average models of order one. A computer program is developed to estimate the parameter of a moving average model of order one based on the method of least squares. (Keywords: time series analysis; consisting; algorithms; subroutines; multivariate analysis).

DESCRIPTORS: (U) *ESTIMATES, *LEAST SQUARES METHOD, ALGORITHMS, COMPUTER PROGRAMS, MULTIVARIATE ANALYSIS, SUBROUTINES, TIME SERIES ANALYSIS, MATHEMATICAL MODELS, RANDOM VARIABLES, PARAMETRIC ANALYSIS.

IDENTIFIERS: (U) *Moving average models, PE61102F, WUAFOSR2304A5.

AD-A186 028

AD-A186 027 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Maximum Likelihood Principle and Model Selection when the True Model is Unspecified.

DESCRIPTIVE NOTE: Technical rept.,

FEB 87 18P

PERSONAL AUTHORS: Nishii, Ryuei

REPORT NO. TR-87-01

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1017

UNCLASSIFIED REPORT

ABSTRACT: (U) Suppose independent observations come from an unspecified distribution. Then we consider the maximum likelihood based on a specified parametric family by which we can approximate the true distribution well. We examine the asymptotic properties of the quasi-maximum likelihood estimate and of the quasi-maximum likelihood. These results will be applied to model selection problem. Keywords: AIC, BIC, Consistency, Law of iterated logarithm MLE, Regularity conditions.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, DISTRIBUTION, MODELS, SELECTION, ASYMPTOTIC SERIES, DISTRIBUTION, MAXIMUM LIKELIHOOD ESTIMATION, SELECTION, DENSITY, MATHEMATICAL MODELS, PARAMETERS, ITERATIONS, ASYMPTOTIC NORMALITY, MULTIVARIATE ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 027

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 026 12/2 12/9

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Simultaneous Estimation of the Number of Signals and Frequencies under a Model with Multiple Sinusoids.

DESCRIPTIVE NOTE: Technical rept.,

DEC 88 35P

PERSONAL AUTHORS: Bai, Z. D.; Krishnaiah, P. R.; Zhao, L. C.

REPORT NO. TR-86-37

CONTRACT NO. F49620-85-C-0008, N00014-83-K-0387

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1016

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors considered the problem of estimation of the frequencies and the number of signals under a signal processing model with multiple sinusoids. The frequencies are estimated with eigenvariation linear prediction method. The number of signals is estimated with an information theoretic criterion. The strong consistency of the estimates of the frequencies and the number of signals is also established. Also, a modification of forward backward linear prediction method is suggested to yield consistent estimators of the frequencies.

DESCRIPTORS: (U) *ESTIMATES, *LINEAR SYSTEMS, *PREDICTIONS, *SIGNAL, MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 026

AD-A186 025 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strong Consistency of Estimation of Number of Regression Variables when the Errors are Independent and Their Expectations are not Equal to Each Other.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 27P

PERSONAL AUTHORS: Wu, Yuehua

REPORT NO. TR-87-15

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1245

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers the linear regression model y sub i = x sub i B + e sub i, i = 1, 2, ..., where (x sub i) - is a sequence of known p-vectors, Beta = (Beta Sub 1, ..., Beta Sub p) is an unknown p-vector, known as regression coefficients, (e Sub i) is a sequence of random errors. It is of interest to test the hypothesis H Sub k: Beta Sub k+1 = ... = Beta Sub p = 0, k = 0, 1,...,p. We do not assume that the random errors are identically distributed and have zero means, since it is sometimes realistic. As a compensation for this relaxation, we assume the errors have a common bounded support A Sub 1, a Sub 2 under certain conditions, we obtain the strongly consistent estimate of the number k for which Beta Sub k is not equal to 0 and Beta Sub k+1 = ... = Beta Sub p = 0, by using the information theoretical criteria.

DESCRIPTORS: (U) *VARIABLES, COEFFICIENTS, CONSISTENCY, ERRORS, HYPOTHESES, STATISTICAL INFERENCE, MULTIVARIATE ANALYSIS, MATHEMATICAL MODELS, REGRESSION ANALYSIS, SEQUENCES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A186 025

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 018 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Explicit Solutions of Moment Problems 1.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Aug 87,

JUL 87 29P

PERSONAL AUTHORS: Kuznezova-Sholpo, Irina; Rachev, Svetlozar T.

REPORT NO. TR-197

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1146

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Saratov State Univ., Saratov, USSR and Bulgarian Academy of Sciences, Inst. of Mathematics, Sofia, Bulgaria.

ABSTRACT: (U) In probability theory the following two measure theoretic problems are well known: 1) Marginal problem: for fixed probability measurers (laws) P Sub 1 and P Sub 2 on a measureable space U and a measurable function c on the product space U Squared = U x U: and 2) Moment problem: for fixed real numbers a sub ij and real-valued continuous functions f sub ij (i = 1,2, j = 1,..., n). This paper is devoted to the explicit solutions of some moment problems on separable metric space U with metric d.

DESCRIPTORS: (U) *MOMENTS, STOCHASTIC PROCESSES, PROBLEM SOLVING, RANDOM VARIABLES, MEASUREMENT, PROBABILITY, REAL NUMBERS, THEORY.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A186 018

AD-A186 017 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Point Processes in the Plane.

DESCRIPTIVE NOTE: Technical rept. Oct 86-Sep 87,

FEB 87 40P

PERSONAL AUTHORS: Merzbach, Ely

REPORT NO. TR-176

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1095

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Bar-Ilan Univ., Dept. of Mathematics, Ramat-Gan, Israel

ABSTRACT: (U) Two-parameter point processes are studied in connection with martingale theory and with respect to the partial-order induced by the Cartesian coordinates of the plane. Point processes are characterized by jump stopping times and by their two-parameter compensators. Properties of the doubly stochastic Poisson process, as predictability, are discussed. A definition for the Palm measure of a two-parameter stationary point process is proposed.

DESCRIPTORS: (U) *POINTS(MATHEMATICS), *STOCHASTIC PROCESSES, CARTESIAN COORDINATES, COMPENSATORS, PARAMETERS, POISSON EQUATION, STATIONARY, STOPPING.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F, Martingales.

AD-A186 017

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 016 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Filtering Solutions for Ill-Posed Linear Problems and Their Extension to Measurable Transformations.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Sep 86,

MAR 87 23P

PERSONAL AUTHORS: Brigola, R.

REPORT NO. TR-180

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1100

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with University of Regensburg, Fed. Rep. of Germany .

ABSTRACT: (U) An ill-posed linear problem Ax=y in Hilbert space is considered as a filtering problem AX+Z=Y for Hilbert space valued random elements. Depending on the models for the signal X and the noise Z, the solutions of this problem are discussed in the context of cylinder measures on hilbert spaces and their radification by the Abstract Wiener space concept. Extensions of the solutions to measurable transformations are given explicity. The filtering solution is related to the solution of the problem Ax=y obtained by Tichonov's regularization method.

DESCRIPTORS: (U) *HILBERT SPACE, *MATHEMATICAL FILTERS, *STOCHASTIC PROCESSES, LINEARITY, TRANSFORMATIONS(MATHEMATICS), MEASUREMENT, PROBLEM SOLVING, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A186 016

AD-A186 015 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Remark on the Multiple Wiener Integral.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Sep 86,

MAR 87 10P

PERSONAL AUTHORS: Brigola, R.

REPORT NO. TR-179

CONTRACT NO. F49620-82-C-6448

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1099

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with University of Regensburg, Fed. Rep. of Germany.

ABSTRACT: (U) A short proof is given for Ito's result that the multiple Wiener integral can be written as an iterated stochastic integral, using the martingale property of Brownian motion and a simple property of symmetric tensor products of the L squared - space. (Author)

DESCRIPTORS: (U) *BROWNIAN MOTION, *STOCHASTIC PROCESSES, SYMMETRY, TENSORS, ITERATIONS, FUNCTIONAL ANALYSIS.

IDENTIFIERS: (U) Martingales, Wiener integrals, Hermitian functions, Lebesgue measure, WUAFOSR 2304A5, PE61102F.

AD-A186 015

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A186 014 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Feynman-KAC's Formula and Its Applications to Filtering Theory.

DESCRIPTIVE NOTE: Technical rept. 30 Sep 85-30 Sep 86,

OCT 86 25P

PERSONAL AUTHORS: Karandikar, Rajeeva L.

REPORT NO. TR-161

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1096

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Indian Statistical Inst. 7, New Delhi, Rept. no. TR-8408.

ABSTRACT: (U) Let (x(t)) be a Markov process, not assumed to be time homogenous. It is well known that (s(t) bar) = (t, X(t)) is a time homogeneous Markov process. Let A be its generator. The Feynman-Kac's formula for x(t) takes the following form if the equation: (1,1) Av + cv = 0 admits a solution v, then v has the representation, for s < t: (1.2) v(s,Xs) = E v(t,Xt) exp(integral(stat) c(u, Xu)du) sigma(Xs). We prove this under general conditions on (Xt) .

DESCRIPTORS: (U) *MARKOV PROCESSES, *MATHEMATICAL FILTERS, HOMOGENEITY, THEORY, TIME STUDIES, NONLINEAR ANALYSIS.

IDENTIFIERS: (U) Feynman Kac theory, Existence theorems, WUAFOSR2304A5, PE61102F.

AD-A186 014

AD-A186 013 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Decoupling Identities and Predictable Transformations in Exchangeability.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Sep 87,

JUN 87 50P

PERSONAL AUTHORS: Kallenberg, Olav

REPORT NO. TR-187

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1108

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Auburn Univ., Mathematics ACA, AL.

ABSTRACT: (U) Let X=(X1,...,Xd) and V=(V1,...,Vd) be processes on (0,1) or R+, such that X is exchangeable while Vd is predictable. Under suitable conditions on X and V, the expression E(pi) Integral over j of (V sub j dX sub j) will only depend on the marginal distributions of X and V. From statements of this type in discrete or continuous time, one may easily derive a variety of old and new results on predictable transformations which preserve the distribution of an exchangeable sequence or process. The same method yields a general result about reduction of continuous local martingales and marked point processes to independent Gaussian and Poisson random fields. Keywords: Stochastic integrals; Product moments; Invariance in distribution; Levy processes; Martingales; Point processes; Brownian bridge; Random time changes.

DESCRIPTORS: (U) *BROWNIAN MOTION, *STOCHASTIC PROCESSES, DECOUPLING, IDENTITIES, INTEGRALS, GAUSSIAN QUADRATURE, POISSON DENSITY FUNCTIONS, INVARIANCE, MOMENTS.

AD-A186 013

AD-A186 013 CONTINUED

PREDICTIONS, TRANSFORMATIONS.

IDENTIFIERS: (U) Levy process, Brownian bridge, Martin gales, WUAFOSR2304A5, PE61102F.

AD-A186 012 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Differential Equations in Duals of Nuclear Spaces with Some Applications.

DESCRIPTIVE NOTE: Technical rept. 30 Sep 85-30 Sep 86,

OCT 86 88P

PERSONAL AUTHORS: Kallianpur, G.

REPORT NO. TR-158

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1101

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Minnesota Univ., MN., Rept. no. IMA-244.

ABSTRACT: (U) These lectures aim at giving an elementary introduction to certain types of stochastic differential equations in infinite dimensional spaces. One lecture introduces countably Hilbertian Nuclear (CHN) spaces and give some examples to illustrate why these infinite dimensional spaces are convenient for the study of some practical problems, e.g. those occuring in stochastic evolutions. This lecture assumes a complete probability spade with a right continuous filtration. It also assumes a given Countably Hilbertian nuclear space. Ornstein-Uhlenbeck stochastic differential equations on duals of nuclear spaces introduces a special class of linear stochastic differential equations with values in duals of nuclear spaces, namely Ornstein-Uhlenbeck type processes with a nuclear valued martingale as a driving term. Weak Convergence of Solutions: now consider the weak convergence of the solutions of to the corresponding stochastic differential equations driven by a Gaussian noise. This last lecture gives an outline of recent works on stochastic evolution equations and nonlinear

AD-A186 012 CONTINUED

stochastic differential equations on the dual of a Countably Hilbert nuclear space.

DESCRIPTORS: (U) *HILBERT SPACE, *LINEAR DIFFERENTIAL EQUATIONS, *NONLINEAR DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, DIFFERENTIAL EQUATIONS, EVOLUTION(GENERAL), BROWNIAN MOTION, MAPPING(TRANSFORMATIONS), GAUSSIAN NOISE, FUNCTIONAL ANALYSIS, PROBABILITY, SIZES(DIMENSIONS), SOLUTIONS(GENERAL), WEAK CONVERGENCE.

IDENTIFIERS: (U) Countably Hilbertian nuclear space, Ornstein Uhlenbeck equations, Frechet space, Martingales, WUAFOSR2304A5, PE61102F.

AD-A186 012

AD-A186 011 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) An Elementary Approach to the Daniell-Kolmogorov Theorem and Some Related Results.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Sep 87,

JUN 87 25P

PERSONAL AUTHORS: Kallenberg, Olav

REPORT NO. TR-188

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1104

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Auburn Univ., Mathematics ACA, AL.

ABSTRACT: (U) A short elementary proof is given of the Daniell Kolmogorov existence theorem for probability measures on product spaces, assuming nothing but the existence of Lebesgue measure on the unit interval. Related approaches are used to prove the existence of regular conditional distributions directly on Polish spaces, and to establish the existence of random measures and sets with given finite dimensional distributions or hitting probabilities, respectively. Keywords: Measures on product spaces; Regular conditional distributions; Random measures; Sets and point field; Finite dimensional distributions; Hitting probabilities.

DESCRIPTORS: (U) *MEASURE THEORY, INTERVALS, PROBABILITY, SIZES(DIMENSIONS), DISTRIBUTION FUNCTIONS.

IDENTIFIERS: (U) Daniell Kolmogorov theorem, *Existence theorems, Lebesgue measure, WUAFOSR2304A5, PE61102F.

AD-A186 011

AD-A185 999 12/3

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Optimal Repeated Measurements Designs for Comparing Test Treatments with a Control.

DESCRIPTIVE NOTE: Interim rept.,

JAN 87 20P

PERSONAL AUTHORS: Majumdar, Dibyen

REPORT NO. TR-87-01

CONTRACT NO. AFOSR-85-0320

PROJECT NO. 2303

TASK NO. A5

MONITOR: AFOSR
TR-87-1540

UNCLASSIFIED REPORT

ABSTRACT: (U) A-optimal and MV-optimal repeated measurements designs are given both for direct and residual treatment effects, for comparing several test treatments with a control. The model considered are basically of two types: without preperiods and the circular model. It is shown that some known balanced and strongly balanced uniform repeated measurements designs can be modified to obtain optimal designs for this problem. Some other methods of finding optimal designs are also given. Keywords: Experimental design; Problem solving.

DESCRIPTORS: (U) *OPTIMIZATION, *EXPERIMENTAL DESIGN, CIRCULAR, PROBLEM SOLVING, RESIDUALS, MATHEMATICAL MODELS, ORTHOGONALITY, MEASUREMENT.

AD-A185 999

AD-A185 994 7/5 20/5

VICTORIA UNIV OF MANCHESTER (ENGLAND) DEPT OF CHEMISTRY

(U) On the Role of Iodine Atoms in the Production of IF(B3 pi) in Fluorine Atom/Iodide Flames,

MAR 87 8P

PERSONAL AUTHORS: Raybone, D.; Watkinson, T. M.; Whitehead, J. C.

CONTRACT NO. AFOSR-85-0039

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1199

UNCLASSIFIED REPORT

Pub. in Chemical Physics Letters, v135 n1,2 p170-176, 27 Mar 87

ABSTRACT: (U) Experiments have been performed to obtain an understanding of the mechanism of Iodine monofluoride(B) production in the flames of fluorine atoms with various iodides. Measurements have been made of the relative IF(B),I(2P1/2) and I(2P3/2) concentrations in a F/Bismuth triiodide flame under various conditions, including the addition of oxygen (1 delta). The IF(B) vibrational state distributions from a wide range of F atom/iodide flames, both with and without the addition of metastable species such as O2(1 delta) and NF(1 sigma), have a characteristic form, being Boltzmann for the lower vibrational levels but having an excess population for the higher levels. This striking similarity suggests a universal mechanism for IF(B) production. It is proposed that this involves the recombination of an excited iodine atom (2P1/2) with a ground-state fluorine atom. A kinetic model based on this proposal is shown to account for all the measurements. Keywords: Chemiluminescence, Laser fluorescence. (Reprints)

DESCRIPTORS: (U) *ATOMS, *CHEMILUMINESCENCE, *FLAMES, *FLUORINE, *IODINE, *RECOMBINATION REACTIONS, FLUORIDES, GROUND STATE, IODIDES, IODINE COMPOUNDS, KINETICS, LASER

AD-A185 994

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 994 CONTINUED

INDUCED FLUORESCENCE, METASTABLE STATE, MODELS, OXYGEN, REPRINTS, VIBRATION, SYNTHESIS(CHEMISTRY), SPECTROSCOPY, BISMUTH, COLLISIONS, EXCITATION.

IDENTIFIERS: (U) Atom Atom interactions, PE61102F, WUAFOSR2303B1.

AD-A185 994

AD-A185 984 7/3 20/5

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Rearrangements in Mass Spectrometry of Cyclosilanes.

86 6P

PERSONAL AUTHORS: Blinka, Thomas A.; West, Robert

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1620

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Silicon, Germanium, Tin and Lead Compounds, v9 n1 p81-85 1986.

ABSTRACT: (U) Mass spectra of methylcyclosilanes (Me2Si) n, n = 6 to 9, are identical to those of branched five-membered ring isomers. Cracking patterns indicate that ionization of the unbranched cyclosilane rings is followed by rapid rearrangement to branched cation-radicals before fragmentation occurs. (Silanes)

DESCRIPTORS: (U) *RECOMBINATION REACTIONS, CRACKS, FRAGMENTATION, IONIZATION, MASS SPECTROMETRY, CYCLIC COMPOUNDS, METHYL RADICALS, CROSSLINKING(CHEMISTRY), MIGRATION, MOLECULAR IONS.

IDENTIFIERS: (U) Methylcyclosilanes, *Cyclosilanes, PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 885 9/3

SCHWARTZ ELECTRO-OPTICS INC CONCORD MA BOSTON DIV

(U) Characterization of ER,Cr:YSGG.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 86,

JUN 87 36P

PERSONAL AUTHORS: Moulton, Peter F.

CONTRACT NO. F49620-86-C-0074

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-87-1166

UNCLASSIFIED REPORT

ABSTRACT: (U) A study of the spectroscopic and laser properties of the crystal erbium-and chromium-doped yttrium scandium gallium garnet (Er, Cr:YSGG) has been carried out. The absorption spectra form 300-1700 nm and the emission spectra in the regions around 800, 1600 and 2800 nm have been measured, along with the kinetics of emission and decay under pulsed excitation. Energy levels of the erbium ion have been determined. Analysis of the data shows that energy transfers from excited chromium ions to erbium ions with near-100% efficiency. The 2800-nm-region laser performance of Er,Cr:YSGG, under flashlamp pumping conditions has been observed and found to be superior in some aspects to other erbium-doped crystals. (Keywords: Lasers, Solid State, 2800 nm lasers, Erbium Doped).

DESCRIPTORS: (U) *CHROMIUM, *ERBIUM, *LASERS, ABSORPTION SPECTRA, EMISSION, EMISSION SPECTRA, ENERGY LEVELS, EXCITATION, FLASH LAMPS, IONS, KINETICS, PULSES, PUMPING, SPECTROSCOPY.

AD-A185 881 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Global Bifurcation of Periodic Solutions with Symmetry,

JUL 87 148P

PERSONAL AUTHORS: Fiedler, Bernold

REPORT NO. LCDS/CCS-87-29

CONTRACT NO. AFOSR-84-0376

MONITOR: AFOSR
TR-87-1556

UNCLASSIFIED REPORT

ABSTRACT: (U) If we are given a dynamic system with some built-in symmetry, should we except periodic motions which somehow reflect this symmetry? And how would periodicity harmonize with symmetry? We are lead from dynamics to topology algebra, singularity theory, numerical analysis, and to some applications. A global point of view is one guiding theme along the way: we are mainly interested in periodic motions far from equilibrium. For a method we rely on bifurcation theory, on transversality theory, and on generic approximations. As a reward we encounter known local singularities. As a central new aspect we study the global interaction and interdependence of these local singularities, designing a homotopy invariant. As a result, we obtain an index 'H' which evaluates only information at stationary solutions. Nonzero 'H' implies global Hopf bifurcation of periodic solutions with certain symmetries. Putting it emphatically, 'H' harmonizes symmetry and periodicity. Curiously, 'H' need not be homotopy invariant.

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), ALGEBRA, ALGEBRAIC TOPOLOGY, DYNAMICS, GLOBAL, INTERACTIONS, INVARIANCE, MOTION, NUMERICAL ANALYSIS, PERIODIC FUNCTIONS, SOLUTIONS(GENERAL), STATIONARY, SYMMETRY, THEORY, TOPOLOGY.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 876 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Co-Optional Times and Invariant Measures for Transient Markov Chains.

DESCRIPTIVE NOTE: Technical rept.,

86 11P

PERSONAL AUTHORS: Jacobsen, Martin

REPORT NO. TR-57

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0999

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Applied Probability, p49-58 1986.

ABSTRACT: (U) Using properties of last-exit times, and more generally co-optional times, two necessary and sufficient conditions are established for the existence of an invariant measure for an irreducible transient Markov chain. The conditions are also related to the classical condition due to Harris and Veech. Keywords: Duality; Time reversal; Reprints.

DESCRIPTORS: (U) *MARKOV PROCESSES, INVARIANCE, REPRINTS, REVERSIBLE, TRANSIENTS, TIME STUDIES.

IDENTIFIERS: (U) MARKOV chains, PE61102F, WUAFOSR2304A5.

AD-A185 876

AD-A185 875 12/3

CONNECTICUT UNIV STORRS

(U) Robust Prediction and Interpolation for Vector Stationary Processes. 2d Enriched Version.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-30 Jun 87,

MAY 87 6P

PERSONAL AUTHORS: Papantoni-Kazakos, P.

CONTRACT NO. AFOSR-83-0229

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1234

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objectives of this research have been the development of smooth nonparametric estimators of quantile functions from right-censored data and the further study of smooth density estimators from censored observations. In particular, kernel type and generalized quantile estimators have been obtained under censoring which give better estimates of percentiles of the lifetime distribution than the usual product-limit quantile estimator. Other new results include the study of linear empirical Bayes estimators, prediction intervals for the inverse Gaussian distribution, nonparametric hazard rate estimation under censoring, nonparametric inference for step-stress accelerated life tests under censoring. Discrete failure models, reliability estimation when cause of failure is partially known, Gompertzian failure models, simultaneous confidence intervals for pairwise differences of normal means, and optimal designs for comparing treatments with a control.

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, ACCELERATED TESTING, CONFIDENCE LIMITS, DISTRIBUTION, ESTIMATES, FAILURE, HAZARDS, INTERPOLATION, INTERVALS, INVERSION, MODELS, NORMAL DISTRIBUTION, RATES, RELIABILITY, STATISTICAL PROCESSES, BIBLIOGRAPHIES, MATHEMATICAL PREDICTION.

AD-A185 875

AD-A185 875 CONTINUED

IDENTIFIERS: (U) *Quantile functions, PE61102F, WUAFOSR2304A5.

AD-A185 862 23/6 12/4

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Development and Evaluation of a Casualty Evacuation Model for a European Conflict.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 83-31 Dec 86.

AUG 87 107P

PERSONAL AUTHORS: Kennington, Jeffery L.

CONTRACT NO. AFOSR-83-0278

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-0970

UNCLASSIFIED REPORT

ABSTRACT: (U) Chapter 1 using Two Sequences of Pure Network Problems to Solve the Multicommodity Network Flow Problem, Chapter 2 Networks with Side Constraints: An LU Factorization Update, Chapter 3 The Frequency Assignment Problem: A Solution via Nonlinear Programming, Chapter 4 A Generalization of Polyak's Convergence Result for Subgradient Optimization, Chapter 5 The Equal Flow Problem, Chapter 6 A Parallelization of the Simplex Algorithm, Chapter 7 Minimal Spanning Trees: A Computational Investigation of Parallel Algorithms.

DESCRIPTORS: (U) *ALGORITHMS, *CASUALTIES, *MEDICAL EVACUATION, *MATHEMATICAL MODELS, COMPUTATIONS, CONVERGENCE, EUROPE, FLOW, FREQUENCY ALLOCATION, NETWORKS, NONLINEAR PROGRAMMING, OPTIMIZATION, PARALLEL PROCESSING, SEQUENCES, WARFARE, COMPUTATIONS, FORMULAS(MATHEMATICS), THESES, OPERATIONS RESEARCH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A185 824 12/2

CALIFORNIA UNIV SANTA BARBARA ALGEBRA INST

(U) Stability Analysis of Finite Difference Schemes for Hyperbolic Systems, and Problems in Applied and Computational Linear Algebra.

DESCRIPTIVE NOTE: Interim rept. 1 May 86-30 Apr 87,

JUN 87 42P

PERSONAL AUTHORS: Marcus, Marvin; Goldberg, Moshe

CONTRACT NO. AFOSR-83-0150

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1466

UNCLASSIFIED REPORT

ABSTRACT: (U) Two projects are described: (a) Stability criteria for difference approximations to hyperbolic systems, and multiplicativity of matrix norms; and (b) Problems in applied and computational linear algebra. The aim of these projects was to achieve better understanding of useful computational techniques for hyperbolic initial-boundary value problems, and to improve basic mathematical tools often used in numerical analysis and applied mathematics.

DESCRIPTORS: (U) *FINITE DIFFERENCE THEORY, *LINEAR ALGEBRA, APPLIED MAT EMATICS, APPROXIMATION(MATHEMATICS), BOUNDARY VALUE PROBLEMS, COMPUTATIONS, HYPERBOLAS, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A185 818 12/3

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Stochastic Approximation and Large Deviations: General Results for W.p.1. Convergence,

FEB 87

PERSONAL AUTHORS: Dupuis, Paul; Kushner, Harold J.

REPORT NO. LCDS/CCS-87-21

CONTRACT NO. N00014-83-K-0542, $AFOSR-85-0315

MONITOR: AFOSR
TR-87-1528

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by contract DAAG29-84-K-0082 and Grants NSF-DMS85-11470, NSF ECS85-05674.

ABSTRACT: (U) W.p.1. convergence results are obtained for stochastic recursive approximation algorithms under very general conditions. The gain sequence (a sub n) can go to zero very slowly and state-dependent noise, discontinuous dynamical equations and the projected or constrained algorithm are all treated. The basic technique is the theory of large deviations. Prior results obtained via this theory are extended in many directions. Keywords: Local linearization; Errors for tracking systems.

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), *CONVERGENCE, *STOCHASTIC PROCESSES, ALGORITHMS, DYNAMICS, EQUATIONS, GAIN, LINEARITY, RECURSIVE FUNCTIONS, SEQUENCES, THEORY, TRACKING.

IDENTIFIERS: (U) *Large deviations.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 817 5/8 6/4

NORTHEASTERN UNIV BOSTON MA DEPT OF PSYCHOLOGY

(U) Attention and the Order of Items in Short-Term Visual Memory.

86 15P

PERSONAL AUTHORS: Reeves, Adam

CONTRACT NO. AFOSR-84-0288

MONITOR: AFOSR
TR-87-1518

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Psychological Research, v48 p239-250 1986.

ABSTRACT: (U) Subjects first detected a target presented at the left of fixation, and then attempted to report, in order, the first four items (numerals or shapes) in a stream of items presented to the right of fixation. At comparably difficult presentation rates, 10/s for numerals and 5/s for shapes, reports showed a mixture of correctly ordered items with items reported in a direction opposite to their order of presentation. Reports fit a three-parameter attention-gating model (AGM), which assumes that (1) after target detection, an attention gate opens briefly to allow items to enter visual short-term memory (VSTM), and (2) report order is determined by the attention each item receives in VSTM. Items presented either early or late in the stream tend to receive less attention and are thus reported as later than more central items. The fit to the AGM for both numerals and unlabelled shapes provides evidence that reports reflect order in short-term visual (rather than verbal) memory.

DESCRIPTORS: (U) *ATTENTION, *MEMORY(PSYCHOLOGY), *VISUAL PERCEPTION, GATES(CIRCUITS), IMAGE PROCESSING, REPRINTS, SHAPE, SHORT RANGE(TIME), STREAMS, TARGET DETECTION, VISION.

IDENTIFIERS: (U) Short term memory GM(Attention Gating Model).

AD-A185 817

AD-A185 816 6/4 20/6

EYE RESEARCH INST OF RETINA FOUNDATION BOSTON MA

(U) Lightness Models, Gradient Illusions, and Curl.

87 17P

PERSONAL AUTHORS: Arend, Lawrence E., Goldstein, Robert

CONTRACT NO. F49620-83-C-0052

MONITOR: AFOSR
TR-87-1510

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Perception and Psychophysics, v42 n1 p65-80 1987.

ABSTRACT: (U) Gradient illusions require that models of suprathreshold appearance include a spatial integration that fills areas between edges. We describe a structural problem inherent in such models: for many scenes there are inconsistencies (nonzero curl) in thresholded derivatives that prevent simple spatial integration. Our experiments show that the human visual system does encounter curl problems and that it uses two different types of perceptual solution: field segmentation and lightness-gradient manipulation. The latter occurs under conditions where field segmentation is impossible, at least two such conditions can occur; failure to form a segmenting contour and topological problems in potential segmenting contours. (Author)

DESCRIPTORS: (U) *ILLUSIONS, *VISUAL PERCEPTION, *SPACE PERCEPTION, GRADIENTS, HUMANS, INTEGRATION, SEGMENTED, SOLUTIONS(GENERAL), SPATIAL DISTRIBUTION, STRUCTURAL PROPERTIES, TOPOLOGY, VISION, MATHEMATICAL MODELS, BRIGHTNESS, THRESHOLDS(PHYSIOLOGY), CONTRAST, LUMINANCE, VECTOR ANALYSIS, CONTOURS, REPRINTS.

IDENTIFIERS: (U) Gradient Illusions, Curl(Vectors), Visual fields.

AD-A185 816

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 806 12/2

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Existence and Stability of Transition Layers,

APR 87 61P

PERSONAL AUTHORS: Hale, Jack K.; Sakamoto, Kunimochi

REPORT NO. LCDS/CCS-87-27

CONTRACT NO. DAAL03-86-K-0074, $AFOSR-84-0376

MONITOR: AFOSR TR-87-1525

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-DMS85-07056.

ABSTRACT: (U) For a second order nonautonomous singularly perturbed ordinary differential equation with Neumann boundary conditions, the existence of single transition layer solutions is proved by using the method of Liapunov-Schmidt. The method also gives the stability of these solutions as an equilibrium point of a parabolic equation. Keywords: Theorem; Approximation(Mathematics); Linear operators; Eigenvalues.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *EIGENVALUES, *OPERATORS(MATHEMATICS), EQUATIONS, EQUILIBRIUM(GENERAL), LAYERS, LINEARITY, PARABOLAS, SOLUTIONS(GENERAL), STABILITY, TRANSITIONS, DIFFERENTIAL EQUATIONS, EIGENVALUES, EQUATIONS, EQUILIBRIUM(GENERAL), LAYERS, LINEARITY, OPERATORS(MATHEMATICS), PARABOLAS, SOLUTIONS(GENERAL), STABILITY, TRANSITIONS, PERTURBATION THEORY.

IDENTIFIERS: (U) Neumann condition, Liapunov Schmidt method, Bifurcation theory.

AD-A185 806

AD-A185 805 12/4

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Optimal and Approximately Optimal Control Policies for Queues in Heavy Traffic,

MAR 87 59P

PERSONAL AUTHORS: Kushner, Harold J.; Ramachandran, K. M.

REPORT NO. LCDS/CCS-87-24

CONTRACT NO. N00014-85-K-0607, $AFOSR-85-0315

MONITOR: AFOSR TR-87-1517

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contract DAAG29-84-K-0082 and Grant NSF-ECS85-05674.

ABSTRACT: (U) We treat the 'approximately' optimal control problem for tandem queueing or production networks (with local feedback allowed) under heavy traffic. The buffers (scaled with traffic) are finite. The controls allow various inputs, connecting links and the processors to be shut down or opened, in order to manage the system. The service and arrival rates, as well as the routing probabilities can also be controlled, and the system statistics can depend on the system state (scaled buffer occupancies). The associated costs involve holding costs, costs for shutting off/on the links or processors and the opportunity cost for lost production. It is shown that the (scaled) controlled system converges weakly (in an appropriate sense) to a controlled limit 'reflected' diffusion. In the rescaled time, the actions of the controllers lead to multiple 'simultaneous' impulses in the limit problem. Thus we have a non-standard limit control problem, and the usual methods of weak convergence for systems under heavy traffic must be modified. Since the optical or nearly optimal controls for the physical process are usually not possible to get, it is of considerable interest to know whether an optimal or nearly optimal control for the limit process is also nearly optimal for the physical system with heavy traffic. This is shown to be true, under reasonable conditions. Although the limit control problem is non-standard and

AD-A185 805

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 805 CONTINUED

there is little available theory concerning it, acceptable numerical procedures are available. Keywords: Numerical methods for stochastic control.

DESCRIPTORS: (U) *OPTIMIZATION, *QUEUEING THEORY, *STOCHASTIC CONTROL, ARRIVAL, BUFFERS, CONTROL, CONTROL SYSTEMS, COSTS, FEEDBACK, LIMITATIONS, NETWORKS, NUMERICAL METHODS AND PROCEDURES, PHYSICAL PROPERTIES, POLICIES, PRODUCTION, RATES, STATISTICS, TRAFFIC, WEAK CONVERGENCE.

AD-A185 804 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Shadow Systems and Attractors in Reaction-Diffusion Equations,

APR 87 30P

PERSONAL AUTHORS: Hale, Jack K.; Sakamoto, Kunimochi

REPORT NO. LCDS/CCS-87-28

CONTRACT NO. DAAL03-86-K-0074, $AFOSR-84-0376

MONITOR: AFOSR TR-87-1526

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-DMS85-07056.

ABSTRACT: (U) For a pair of reaction diffusion equations with one diffusion coefficient very large, there is associated a reaction diffusion equation coupled with an ordinary differential equation (the shadow system) with nonlocal effects which has the property that it contains all of the essential dynamics of the original equations. Keywords: Theorems; Graphs; Partial differential equations.

DESCRIPTORS: (U) *DIFFUSION COEFFICIENT, *PARTIAL DIFFERENTIAL EQUATIONS, DIFFERENTIAL EQUATIONS, DIFFUSION, DYNAMICS, EQUATIONS, GRAPHS, RESPONSE, SHADOWS, PERTURBATIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 802 12/9 23/2

MINNESOTA UNIV DULUTH

(U) Structure from Motion.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-30 Nov 86,

NOV 76 33P

PERSONAL AUTHORS: Thompson, William B.

CONTRACT NO. AFOSR-85-0382

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1576

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant results were obtained on the problems associated with motion based segmentation. A method for combining motion based edged detection techniques has been devised. Also, the interpretation of the structure of motion boundaries has been investigated in human vision. Contents: Relative motion: Kinetic information for the order of depth at an edge; Acceleration based structure from motion; and detecting moving objects.

DESCRIPTORS: (U) *MOTION, *VISUAL PERCEPTION, ACCELERATION, BOUNDARIES, DEPTH, DETECTION, HUMANS, KINETICS, MOVING TARGETS, VISION.

IDENTIFIERS: (U) Edge detection, PE61102F, WUAFOSR2304A3.

AD-A185 802

AD-A185 793 12/1 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE COMPUTATIONAL FLUID DYNAMICS LAB

(U) Computational Methods for complex Flowfields.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 82-31 May 87,

JUL 87 168P

PERSONAL AUTHORS: Murman, Earll M.; Baron, Judson R.

CONTRACT NO. AFOSR-82-0136

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-87-1285

UNCLASSIFIED REPORT

ABSTRACT: (U) The development of solution algorithms for complex flowfields have been the objective of this research. Embedded subdomains were used to resolve relevant physical processes in a global flow around aerodynamic bodies. Both non-adaptive and adaptive approaches were studied and developed. Results for solving the two dimensional Euler equations using non-adaptive and adaptive finite volume and finite element work are summarized. A new approach is reported for combining expert system approaches with adaptive procedural algorithms into a totally integrated methodology. Algorithms for adaptive explicit and non-adaptive semi-implicit Navier-Stokes calculations are reported. Recent results on formulation of outflow boundary conditions for the Navier-Stokes equations are also presented. Keywords: Euler equations; Navier Stokes equations; Finite element methods; Embedded grids; Adaptive grids; Computational fluid dynamics.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *FLOW FIELDS, ADAPTIVE SYSTEMS, AERODYNAMICS, ALGORITHMS, BOUNDARIES, COMPUTATIONS, DIFFERENTIAL EQUATIONS, EMBEDDING, FLOW, FLUID DYNAMICS, GLOBAL, GRIDS, INTEGRATED SYSTEMS, METHODOLOGY, NAVIER STOKES EQUATIONS, NUMERICAL METHODS AND PROCEDURES, SOLUTIONS(GENERAL), TWO DIMENSIONAL,

AD-A185 793

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 793 CONTINUED

VOLUME, FORMULAS(MATHEMATICS).

IDENTIFIERS: (U) Computational fluid dynamics, Euler equations, Expert systems, PE61102F, WUAFOSR2307A1.

AD-A185 792 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Polarity-Dependent Barriers and the Photoisomerization Dynamics of Molecules in Solution,

APR 87 9P

PERSONAL AUTHORS: Hicks, J. M.; Vandersall, M. T.; Sitzmann, E. V.; Eisenthal, K. B.

CONTRACT NO. AFOSR-84-0013

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1506

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v135 n4-5 p413-420, 10 Apr 87.

ABSTRACT: (U) The dynamics of molecular isomerizations that involve major charge redistributions are studied using picosecond lasers. The usual assumptions that the isomerizations barrier is independent of temperature and constant within a solvent series are found to be incorrect due to solvent polarity effects. Polarity and hydrogen bonding effects on isomerizations involving large dipole moment changes (dimethylaminobenzonitrile) and those involving a polar intermediate (stilbene) are discussed.

DESCRIPTORS: (U) *DIPOLE MOMENTS, *POLARITY, HYDROGEN BONDS, LASERS, REPRINTS, SOLVENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A185 791 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) A Class of Life Distributions for Aging,

MAR 86 6P

PERSONAL AUTHORS: Hollander, Myles; Park, Dong H.; Proschan, Frank

CONTRACT NO. F49620-85-C-0007

MONITOR: AFOSR TR-87-1550

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Statistical Association, v81 n393 p91-95 Mar 86.

ABSTRACT: (U) The authors introduce a new better than used of age t sub o (NBU t sub o) class of life distributions, where the survival probability at age 0 is greater than or equal to the conditional survival probability at specified age t sub o > 0. The dual class of new worse than used of age t sub o (NWU)- t sub o) life distributions is obtained by reversing the direction of inequality. In Section 3 the authors propose a test of the null hypothesis that a new item has stochastically the same residual life length than does a used item of age t sub o. In Section 4 Pitman's asymptotic relative efficiency is used to study large-sample power properties of the test. (Author)

DESCRIPTORS: (U) *STATISTICAL TESTS, *LIFE TESTS, HYPOTHESES, LIFE EXPECTANCY(SERVICE LIFE), LIFE SPAN(BIOLOGY), NULLS(AMPLITUDE), PROBABILITY, REPRINTS, RESIDUALS, SURVIVAL(GENERAL), AGING(PHYSIOLOGY), PROBABILITY DISTRIBUTION FUNCTIONS.

IDENTIFIERS: (U) *Life distributions.

AD-A185 790 20/3 12/3

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) Optimal Projection Equations for Discrete-Time Fixed-Order Dynamic Compensation of Linear Systems with Multiplicative White Noise,

87 10P

PERSONAL AUTHORS: Bernstein, Dennis S.; Haddad, Wassim M.

CONTRACT NO. F49620-86-C-0002, $AFOSR-86-0002

MONITOR: AFOSR TR-87-1549

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Control, v46 n1 p65-73 1987.

ABSTRACT: (U) The optimal projection equations for discrete-time reduced-order dynamic compensation are generalized to include the effects of state, control-and measurement-dependent noise. In addition, the discrete-time static output feedback problem with multiplicative disturbances is considered. For both problems, the design equations are presented in a concise, unified manner to facilitate their accesiblity for devleoping numerical algorithms for practical applications. Keywords: Reprints; White noise, Riccati equations, Lyapunov equations; Stochastic effects. (Author)

DESCRIPTORS: (U) *WHITE NOISE, *CONTROL THEORY, *FEEDBACK, ALGORITHMS, COMPENSATION, DISCRETE DISTRIBUTION, DYNAMICS, EQUATIONS, LINEAR SYSTEMS, MULTIPLICATION FACTOR, OPTIMIZATION, REDUCTION, REPRINTS, TIME, STOCHASTIC PROCESSES, RICCATI EQUATION, LYAPUNOV FUNCTIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 787 6/1 6/5

NORTHWESTERN UNIV EVANSTON IL COLL OF ARTS AND SCIENCES

(U) Phosphoproteins in Neuronal Function. Proceedings of the International Workshop (2nd) Held in Utrecht, Netherlands on 2-5 September 1985.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul-31 Dec 86,

86 408P

PERSONAL AUTHORS: Routtenberg, Aryeh; Gispen, W. H.

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-87-1351

UNCLASSIFIED REPORT

Availability: Elsevier Science Publishing Co., Inc., New York, NY 10017. HC $131.00. No copies furnished by DTIC/ NTIS.

ABSTRACT: (U) This is the book of papers from the Second International Workshop on Brain Phosphoprotein function held in Utrecht. Partial Contents: Protein Phosphorylation and Polyphosphoinositide Metabolism; Ligand-stimulated turnover of inositol lipids in the nervous system; The role of inositol phosphates in intracellular calcium mobilization; Possible roles of protein kinase C in signal transduction in nervous tissues; Polyphosphoinositides, phosphoproteins and receptor function in rabbit iris smooth muscles; Pharmacological aspects of the inositide response in the central nervous system: the muscarinic acetylcholine receptor; Ion Channels: Modulation of ion channels by Calcium activated protein phosphorylation: a biochemical mechanism for associative learning; Cyclic nucleotides as modulators and activators of ionic channels in the nerve cell membrane; Receptors: Phosphorylation of the nicotinic acetylcholine receptor; Molecular mechanisms involved in the desensitization of dopamine receptors in slices of corpus striatum; Growth factor activation of protein kinase C-dependent and -independent pathways of protein phosphorylation in fibroblasts; relevance to activation of protein kinase C in neuronal tissues; Plasticity: Synaptic plasticity and protein kinase C; Protein phosphorylation in the nerve growth cone; Long-term potentiation and 4-aminopyridine-induced changes in protein and lipid phosphorylation in the hippocampal slice; Phosphorylation/dephosphorylation mechanisms in coated vesicles; Cyclic nucleotide- and calcium-dependent protein phosphorylation in rat pineal gland: physiological and pharmacological regulation; Synapsin I: A review of its distribution and biological regulation.

DESCRIPTORS: (U) *BRAIN, *PHOSPHOPROTEINS, *NEUROCHEMISTRY, ACTIVATION, ASSOCIATIVE PROCESSING, BIOCHEMISTRY, CALCIUM, CELLS(BIOLOGY), CENTRAL NERVOUS SYSTEM, CYCLIC COMPOUNDS, FIBROBLASTS, INTERNATIONAL, IONS, IRIS, LEARNING, LIPIDS, MEMBRANES(BIOLOGY), METABOLISM, MODULATION, MOLECULAR PROPERTIES, MUSCLES, NERVE CELLS, NERVES, NERVOUS SYSTEM, NUCLEOTIDES, PHOSPHORYLATION, PINEAL GLAND, PROTEINS, RABBITS, RATS, RESPONSE(BIOLOGY), SENSE ORGANS, SIGNALS, SYNAPSE, TISSUES(BIOLOGY), GROWTH(PHYSIOLOGY), NERVE TRANSMISSION.

IDENTIFIERS: (U) PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 778 6/4

EYE RESEARCH INST OF RETINA FOUNDATION BOSTON MA

(U) Simultaneous Color Constancy.

OCT 86 10P

PERSONAL AUTHORS: Arend, Lawrence; Reeves, Adam

CONTRACT NO. F49620-83-C-0052

MONITOR: AFOSR
TR-87-1509

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Optical Society of America A, v3 n10 p1743-1751 Oct 86.

ABSTRACT: (U) Observers matched patches (simulated Munsell papers) in two simultaneously presented computer-controlled displays, a standard array presented under 6500-K illumination and a test array under 4000 or 10,000 K. Adaptation to the test illuminants was limited. The adjusted patch was surrounded by a single color (annulus display) or by many colors (Mondrian display). Observers either matched hue and saturation or made surface-color (paper) matches in which the subject was asked to make the test patch look as if it were cut from the same piece of paper as the standard patch. For two of the three subjects, the paper matches were approximately color constant. The hue-saturation matches showed little color constancy. Moreover, the illumination difference between the two displays was always visible. Our data show that simultaneous mechanisms alone (e.g., simultaneous color contrast) alter hues and saturations too little to produce hue constancy.

DESCRIPTORS: (U) *COLORS, *COLOR VISION, *VISUAL PERCEPTION, ARRAYS, CONTRAST, DISPLAY SYSTEMS, ILLUMINATION, MATCHING, OBSERVERS, SATURATION, SYNCHRONISM, COMPUTER GRAPHICS, SATURATION, REPRINTS.

IDENTIFIERS: (U) *Color constancy, Hue.

AD-A185 778

AD-A185 774 17/8 12/3 12/9

MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA
DEPT OF ELECTRICAL EN GINEERING AND SCIENCE

(U) Statistical Techniques for Signal Processing.

DESCRIPTIVE NOTE: Annual interim rept. 1 Nov 85-31 Oct 86,

DEC 86 7P

PERSONAL AUTHORS: Kassam, Saleem A.

CONTRACT NO. AFOSR-82-0022

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1455

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research accomplishments in the 12 month period Nov. 1, 1985 - Oct. 31, 1986. Significant advances have been made in nonlinear filtering based on robust estimation, on nonparametric detection, and on a new noise model for signal - dependent and multiplicative noise. Reference is made to 11 publications. Keywords include: Nonlinear filters, Robust estimates, Rank estimates, Nonparametric detection, Conditional tests, Quantization, Non-Gaussian noise.

DESCRIPTORS: (U) *ESTIMATES, *FILTERS, *NOISE, *NONLINEAR SYSTEMS, *RANK ORDER STATISTICS, *SIGNAL PROCESSING, *STATISTICAL PROCESSES, MODELS, MULTIPLICATION FACTOR.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 774

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 768 12/3 25/5

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Stochastic Systems with Small Noise, Analysis and Simulation; A Phase Locked Loop Example,

JUN 87 20P

PERSONAL AUTHORS: Dupuis, P.; Kushner, H. J.

CONTRACT NO. DAAG29-84-K-0082, AFOSR-81-0116

MONITOR: ARO, AFOSR
20534.10-MA, TR-87-1511

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Applied Mathematics, v47 n3 p643-661 Jun 87.

ABSTRACT: (U) Systems with wide bandwidth noise inputs are a common occurrence in stochastic control and communication theory and elsewhere, e.g., tracking or synchronization systems such as phase locked loops (PLL). One is often interested in calculating such quantities as the probability of escape from a desired error set, in some time interval, or the mean time for such escape. Diffusion approximations (the system obtained in the limit bandwidth as the approaches limit of infinity) are often used for this since they are easier to analyze. When the noise effects in the physical system are small, one is tempted to do an asymptotic analysis (noise intensity approaches limit of 0) on the diffusion approximation, and use this for the desired estimates on the original system. Such a procedure does not work in general: the double limit bandwidth approaches limit of infinity, intensity approaches limit of 0 is not always justified. Under quite broad conditions on the noise processes, it is justified for the systems studied here. We study a particular form of the PLL owing to the great practical importance of the system and because it provides a useful vehicle for understanding the extent of validity of the asymptotic methods for such systems. The basic analytical techniques are from the theory of large deviations. One seeks information on the escape probabilities, mean times, and on the most likely exit paths and exit locations. Also, we seek information on the interactions between the signals to be tracked and

the noise which are most likely to lead to exit. The large deviations technique is eminently suited to this job. (Reprints)

DESCRIPTORS: (U) *NOISE, *PHASE LOCKED SYSTEMS, *STOCHASTIC CONTROL, APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, BROADBAND, DIFFUSION, ERRORS, ESCAPE SYSTEMS, EXITS, INFORMATION THEORY, INTENSITY, INTERACTIONS, LIMITATIONS, LOOPS, MEAN, METHODOLOGY, NOISE(SOUND), PATHS, POSITION(LOCATION), PROBABILITY, SIMULATION, STOCHASTIC PROCESSES, SYNCHRONIZATION(ELECTRONICS), TIME, TIME INTERVALS, TRACKING, VALIDATION, BANDWIDTH, REPRINTS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 767 11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Precipitation of Iron Oxide Filler Particles into an Elastomer,

87

PERSONAL AUTHORS: Liu, S.; Mark, J. E.

CONTRACT NO. DAAL03-86-K-0032, $AFOSR-83-0027

MONITOR: ARO, AFOSR
23255.4-MS, TR-87-1935

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin, v18 p33-37 1987.

ABSTRACT: (U) Samples of peroxide cured butyl rubber were impregnated with anhydrous FeCl3, which was then hydrolyzed in a magnetic field to give ferric hydrous oxide particles. The filler thus formed in-situ was found to give good reinforcement of the elastomer. A relatively small but significant anisotropy was found for both the elongation modules and the equilibrium degree of swelling. Keywords: Iron oxide, Elastomers, FeCl3 hydrolysis, Magnetic particles, Reinforcing fillers, Polyisobutylene.

DESCRIPTORS: (U) *ELASTOMERS, *IRON OXIDES, *PRECIPITATION, ANISOTROPY, BUTYL RUBBER, FILLERS, MAGNETIC FIELDS, PARTICLES, PEROXIDES, SAMPLING, ELONGATION, BUTENES, IRON COMPOUNDS, CHLORIDES, REINFORCING MATERIALS, REPRINTS.

IDENTIFIERS: (U) Polyisbutylenes, Benzoyl peroxide.

AD-A185 767

AD-A185 766 12/1 12/6

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Fast Algorithms for Structural Optimization and Least Squares.

DESCRIPTIVE NOTE: Annual interim rept. 15 Jul 86-14 Jul 87,

AUG 87 11P

PERSONAL AUTHORS: Plemmons, Robert J.

CONTRACT NO. AFOSR-83-0255

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1407

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the activities in support of the Air Force Research Project AFOSR-83-0255 during the past year. Efforts have been made to develop, test and analyze new fast techniques in matrix analysis for structural computations and least squares problems. Applications of this work include structural design and dynamics, and least squares filtering in signal processing. Implementations and tests have been made on modern high performance architectures such as the Cray X-MP, Alliant FX/8, Sequent Balance and the Intel iPSC Hypercube. Our recent work on parallel algorithms for near real-time signal processing computations has led to especially significant results. Keywords: Abstracts; Numerical linear; Algebra; Parallel processing; Signal processing, Structural optimization. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTATIONS, *LEAST SQUARES METHOD, *COMPUTER ARCHITECTURE, ALGEBRA, ARCHITECTURE, DYNAMICS, FILTERS, OPTIMIZATION, PARALLEL PROCESSING, SIGNAL PROCESSING, STRUCTURAL ENGINEERING, STRUCTURAL PROPERTIES, MATRICES(MATHEMATICS), ABSTRACTS, ERROR ANALYSIS, STRUCTURAL ANALYSIS, STRESS STRAIN RELATIONS, ELASTIC PROPERTIES, APPLIED MATHEMATICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A185 766

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 765 12/2

MARYLAND UNIV COLLEGE PARK

(U) Restricted Quadratic Forms, Inertia Theorems and the Schur Complement.

85 45P

PERSONAL AUTHORS: Maddocks, J. H.

CONTRACT NO. AFOSR-87-0073, $AFOSR-86-0097

MONITOR: AFOSR
TR-87-1386

UNCLASSIFIED REPORT

ABSTRACT: (U) The starting point of this investigation is the properties of restricted quadratic forms, x (Transposed) Ax, X an element of S a subset of R superscript m where A is an mxm real symmetric matrix, and S is a subspace. The index theory of Hestenes (1951) and Maddocks (1985) that treats the more general Hilbert space version of this problem is first specialized to the finite dimensional context, and appropriate extensions, valid only in finite dimensions, are made. The theory is then applied to obtain various inertia theorems for matrices and positivity tests for quadratic forms. Expressions for the inertias of divers symmetrically partitioned matrices are described. In particular, an inertia theorem for the generalized Schur complement is given. The investigation recovers, links and extends several, formerly disparate, results in the general area of inertia theorems. (Author)

DESCRIPTORS: (U) *MATRIX THEORY, DIVERS, HILBERT SPACE, INERTIA, SIZES(DIMENSIONS), THEOREMS, QUADRATIC EQUATIONS, SYMMETRY.

IDENTIFIERS: (U) Schur complement.

AD-A185 764 20/4

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF MECHANICAL AND AEROSPACE ENGIN EERING

(U) Time-Dependent Hypersonic Viscous Interactions.

DESCRIPTIVE NOTE: Final rept. Mar 81-Aug 84,

JUN 87 8P

PERSONAL AUTHORS: Reshotko, Eli

CONTRACT NO. AFOSR-81-0150

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1473

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of a wavy wall boundary on the stability of a laminar boundary layer was studied analytically. It was found that Tollmien-Schlichting waves are not excited by the wavy boundary. Only standing waves are produced. A generalization of non-parallel stability formulations was developed for application to any two-dimensional free shear layer.

DESCRIPTORS: (U) *HYPERSONIC FLOW, *BOUNDARY LAYER TRANSITION, BOUNDARIES, FORMULATIONS, HYPERSONIC CHARACTERISTICS, INTERACTIONS, LAYERS, SHEAR PROPERTIES, STABILITY, STANDING WAVES, TIME DEPENDENCE, TWO DIMENSIONAL, WALLS, SURFACE ROUGHNESS.

IDENTIFIERS: (U) Wavy wall boundaries, PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 756 12/1 12/5

MINNESOTA UNIV DULUTH DEPT OF MATHEMATICS AND STATISTICS

(U) Local and Global Techniques for the tracking of Periodic Solutions of Parameter-Dependent Functional Differential Equations.

DESCRIPTIVE NOTE: Final rept. 1 Mar 86-30 Apr 87,

APR 87 29P

PERSONAL AUTHORS: Stech, Harlan W.

CONTRACT NO. AFOSR-86-0071

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-87-1575

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Supersedes report dated 1 Mar 86, AD-A183 222.

ABSTRACT: (U) This project initiated various aspects of an ongoing study of numerical/analytic techniques for the identification of periodic solutions to functional differential equations. The techniques developed apply to very general classes of equations, and have been implemented on a variety of specific model problems. Local techniques refer to methods that apply to the problem of analyzing the Hopf bifurcation structure of small periodic orbits of multiparameter systems. A FORTRAN code, BIFDE, was written to analyze generic bifurcations of general systems with infinite delay. Global tracking methods have been developed to study the growth and parameter dependence of global Hopf bifurcations. Investigations have centered on the development of spine-based approximation techniques and their implementation in a FORTRAN code FDETRAK. Keywords: Mathematical programming, Machine coding; Subroutines, Numerical analysis.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *NUMERICAL ANALYSIS, *MACHINE CODING, FUNCTIONAL ANALYSIS, DELAY,

AD-A185 756

AD-A185 756 CONTINUED

MACHINE CODING, PERIODIC FUNCTIONS, FORTRAN, GLOBAL, METHODOLOGY, TRACKING, MATHEMATICAL PROGRAMMING, NUMERICAL METHODS AND PROCEDURES, ORBITS, TRACKING, SOLUTIONS(GENERAL), MATHEMATICAL MODELS, BIFURCATION(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 755 20/4

STANFORD UNIV CA DEPT OF MATHEMATICS

(U) Caustics of Nonlinear Waves.

87 16P

PERSONAL AUTHORS: Hunter, John K.; Keller, Joseph B.

CONTRACT NO. AFOSR-86-0071

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1552

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Wave Motion, v9 p429-443 1987.

ABSTRACT: (U) The behavior at caustics is analyzed for weakly nonlinear wave solutions of hyperbolic equations. It is shown that short waves, weak enough to be governed by linear or weakly nonlinear geometrical optics away from caustics, are governed by linear theory at and near caustics. For somewhat stronger waves, for which linear theory does not suffice at caustics, a weakly nonlinear caustic theory is developed. It leads to an equation derived by Guiraud, Hayes, and Seebass for gas dynamics.

DESCRIPTORS: (U) *CAUSTICS, *GAS DYNAMICS, *GAS DYNAMICS, EQUATIONS, GEOMETRY, HYPERBOLAS, LINEARITY, NONLINEAR SYSTEMS, REPRINTS, OPTICS, REPRINTS, SOLUTIONS(GENERAL), THEORY, WAVES, PARTIAL DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) Hyperbolic differential equations, PE61102F, WUAFOSR2304A4.

AD-A185 755

AD-A185 749 7/6 11/9

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Molecular Mechanics of Polymeric Interactions.

DESCRIPTIVE NOTE: Final rept. 15 Feb 85-14 Apr 87,

AUG 87 20P

PERSONAL AUTHORS: Prasad, Paras N.

CONTRACT NO. F49620-85-C-0052

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1308

UNCLASSIFIED REPORT

ABSTRACT: (U) The research conducted under this contract focused on the molecular mechanics of polymeric films in relation to their ultrastructure and nonlinear optical properties aimed towards eventual applications in integrated optical and microelectronic devices. Several landmark results were obtained. They are: (i) First demonstrate of femtosecond of response of nonresonant optical nonlinearity in conjugated polymers. (ii) First demonstration of third-harmonic generation from monolayer film of a conjugated polymer. (iii) First case of a conformational transition in a monolayer film of a conjugated polymer. (iv) First picosecond coherent Raman scattering study of a polymeric system. Our studies of third order optical nonlinearities using picosecond and subpisecond degenerate four wave mixing as well as third harmonic degeneration established clearly a strong dependence of X(3) on the effective pie-electron conjugation. Our study of vibrationally resonance enhanced nonlinearity using coherent Raman scattering revealed an enhancement by two orders of magnitude with response still in picoseconds. The Langmuir-Blodgett method was applied for the preparation of monolayer and multilayer films of several types of polydiacetylenes. Our study showed that the Langmuir-Blodgett technique can successfully be used for molecular engineering of ultrathin polymeric films with monomolecular control. Other techniques used for the preparation of ultrathin

AD-A185 749

AD-A185 749 CONTINUED

polymeric films were electrochemical polymerization and gas-solid interface reactions.

DESCRIPTORS: (U) *MOLECULE MOLECULE INTERACTIONS, *POLYMERIC FILMS, COHERENT SCATTERING, LIGHT SCATTERING, RAMAN SPECTRA, POLYMERS, INTEGRATED SYSTEMS, ELECTROCHEMISTRY, POLYMERIZATION, PYRROLES, GASES, INTERFACES, SOLIDS, SURFACE REACTIONS, ACETYLENES, HETEROCYCLIC COMPOUNDS, LASERS, LANGMUIR PROBES, MONOMERS, MICROELECTRONICS, SUBMINIATURE ELECTRONIC EQUIPMENT, MECHANICS, MOLECULES, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, OPTICAL EQUIPMENT, THIRD HARMONIC GENERATION, ENGINEERING, LAYERS, THIN FILMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A185 741 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL

(U) A Monte Carlo Sampling Plan for Estimating Network Reliability,

MAR 87 15P

PERSONAL AUTHORS: Fishman, George S.

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1000

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Operations Research Society of America, v34 n4 p581-594 Jul-Aug 86.

ABSTRACT: (U) For an undirected network G=(V,E) whose arcs are subject to random failure, we present a relatively complete and comprehensive description of a general class of Monte Carlo sampling plans for estimating g=(s,T), the probability that a specified node s is connected to all nodes in a node set T. We also provide procedures for implementing these plans. Each plan uses known lower and upper bounds B, A on g to procedure an estimator of g that has a smaller variance (A-g)(g-B)/K on K independent replications than that obtained for crude Monte Carlo sampling (B=0, A=1). We describe worst-case bounds on sample sizes K, in terms of B and A, for meeting absolute and relative error criteria. We also give the worst-case bound on the amount of variance reduction that can be expected when compared with crude Monte Carlo sampling. Two plans are studied in detail for the case T=t. An example illustrates the variance reductions achievable with these plans. We also give the worst-case bound s on the amount of variance reduction that can be expected when compared with crude Monte Carlo sampling. Two plans are studied in detail for the case T = t. An example illustrates the variance reductions achievable with these plans. We also show how to assess the credibility that a specified error criterion for g is met as the Monte Carlo experiment

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 741 CONTINUED

progresses, and show how confidence intervals can be computed for g. Lastly, we summarize the steps needed to implement the proposed technique.

DESCRIPTORS: (U) *MONTE CARLO METHOD, *NETWORKS, *RELIABILITY, *SAMPLING, CONFIDENCE LIMITS, ERRORS, FAILURE, INTERVALS, NODES, PLANNING, REDUCTION, VARIATIONS, ESTIMATES, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A185 739 20/9 20/5

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) Doppler Shift Methods for Plasma Diagnostics,

JUL 87 19P

PERSONAL AUTHORS: Sassi, M.; Daily, J. W.

CONTRACT NO. AFOSR-86-0067

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-1182

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the AIAA Thermophysics Conference (22nd) 8-10 Jun, Honolulu, HA.

ABSTRACT: (U) Work to develop novel advanced laser spectroscopy plasma diagnostic methods is described. The methods are based on observing the doppler shift in the absorption liners of ionic species. Two methods under study are Velocity Modulated Laser Spectroscopy and Two Beam Doppler Shift Laser Spectroscopy. The theoretical basis of the methods is described and preliminary experimental results presented. Keywords: Laser diagnostics, Plasmas, Laser induced fluorescence, Doppler shift spectroscopy.

DESCRIPTORS: (U) *DOPPLER EFFECT, *LASER INDUCED FLUORESCENCE, *PLASMA DIAGNOSTICS, *SPECTROSCOPY, DIAGNOSIS(GENERAL), IONS, LASERS, MODULATION, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 737 1/3

NORTHWESTERN UNIV EVANSTON IL

(U) Design Methodology for Robust Stabilizing Controllers.

JUN 87 6P

PERSONAL AUTHORS: Schmitendorf, William E.

CONTRACT NO. AFOSR-ISSA-85-00051

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1324

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Guidance, Control and Dynamics, v10 n3 p250-254 May-Jun 87.

ABSTRACT: (U) This paper considers the problem of designing control laws for linear systems with time varying uncertainty. Lyapunov stability theory is used to develop a numerical method of finding a control law that asymptotically stabilizes such systems. This control is robust in the sense that it guarantees asymptotic stability regardless of the disturbance. The results are applied to several aircraft examples. Keywords: Uncertain systems; Stability; Robust control; Linear control problems.

DESCRIPTORS: (U) *CONTROL THEORY, AIRCRAFT, ASYMPTOTIC SERIES, CONTROL, GUARANTEES, LINEAR SYSTEMS, LYAPUNOV FUNCTIONS, NUMERICAL METHODS AND PROCEDURES, STABILITY, THEORY, TIME, REPRINTS, AIRCRAFT, STABILIZATION, THEORY.

IDENTIFIERS: (U) Lyapunov stability theory, Robustness, PE61102F, WUAFOSR2304A1.

AD-A185 737

AD-A185 735 20/9

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 86-31 May 87,

JUN 87 42P

PERSONAL AUTHORS: Michels, H. H.

REPORT NO. UTRC/R87-927258

CONTRACT NO. F49620-85-C-0095

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-87-1263

UNCLASSIFIED REPORT

ABSTRACT: (U) This technical program constitutes a theoretical research investigation of the kinetic mechanisms of negative ion information in plasmas. This study was directed toward elucidating the mechanisms of the most important volume-dependent reactions that occur in hydrogen-ion H-(D-) source devices, primarily of the Belchenko-Dimov-Dudnikov (BDD) type and toward evaluating other light negative anions, such as Li-, as possible sources. The primary goal of this research program was to identify the most important reactions leading to negative ion production or destruction and to estimate these reactions rates as a function of system parameters such as density, composition and temperature. A further goal was to explore new chemical sources for the production of light mass negative atomic ions. The results of this program furnish data and provide direction for more detailed investigations into the kinetics of both gas phase and gas-surface reaction rates of importance in ion source devices and provide input for reliable modeling of such systems. This investigation was carried out using quantum mechanical methods. Both ab initio and density functional approaches were employed in these studies.

DESCRIPTORS: (U) *ION SOURCES, *ANIONS, *PLASMAS(PHYSICS)

AD-A185 735

AD-A185 735 CONTINUED

, *DISSOCIATION, DENSITY, GAS SURFACE INTERACTIONS, RATES, KINETICS, QUANTUM THEORY, PARAMETERS, VAPOR PHASES, LIGHT, IONIZATION, THEORY, HYDROGEN, LITHIUM, REACTION KINETICS, MAGNETRONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7, Ion chemistry, AB initio calculations, Belchenko dimov dudnikov method.

AD-A185 733 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) A Three-Parameter Generalisation of the Beta-Binomial Distribution with Applications.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 21P

PERSONAL AUTHORS: Danaher, Peter J.

REPORT NO. FSU-STATISTICS-M760, TR-87-208

CONTRACT NO. F49620-85-C-0007, $AFOSR-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1041

UNCLASSIFIED REPORT

ABSTRACT: (U) A three-parameter generalisation of the beta-binomial distribution (BBD) is derived and examined. The author obtains the maximum likelihood estimates of the parameters and show that the regularity conditions for asymptotic efficiency are satisfied. To exhibit the applicability of the generalised distribution it is shown how it gives an improved fit over the BBD for magazine exposure and consumer purchasing data. Finally an empirical Bayes estimate of a binomial proportion based on the generalized beta distribution used in this study is derived. Keywords: Random; Variables; Parameter.

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, *PARAMETRIC ANALYSIS, *HYPERGEOMETRIC FUNCTIONS, BAYES THEOREM, BETA PARTICLES, CONSUMERS, DISTRIBUTION, EXPOSURE(GENERAL), MAGAZINES(ORDNANCE), MAXIMUM LIKELIHOOD ESTIMATION, PROCUREMENT, RANDOM VARIABLES, PARAMETERS, BINOMIALS.

IDENTIFIERS: (U) BBD(Beta Binomial Distribution), PE61102F, WUAFOSR2304A5.

AD-A185 735

AD-A185 733

DTIC REPORT BIBLIOGRAPHY

AD-A185 726 7/2

VICTORIA UNIV OF MANCHESTER (ENGLAND) DEPT OF CHEMISTRY

(U) Two-Photon VUV Laser-Induced Fluorescence Detection of I*2P(1/2) and I2P(3/2) from Alkyl Iodide Photodissociation at 248 nm.

MAR 87 8P

PERSONAL AUTHORS: Godwin, F. G.; Gorry, P. A.; Hughes, P. M.; Raybone, D.; Watkinson, T. M.

CONTRACT NO. AFOSR-85-0039

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1198

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v135 n1,2 p163-169, 27 Mar 87.

ABSTRACT: (U) The quantum yields for production of I(2p3/2) and I*(2P1/2) at 248 nm are reported for a variety of alkyl and substituted-alkyl iodides using the technique of two-photon atomic laser-induced fluorescence. These results are combined with those of others to provide quantum yields over a wide range of radical sizes, structures and substitutions. A model which incorporates impulsive energy disposal for the dissociation followed by a Landau-Zener description of the 3Q0-1Q1 curve crossing gives a good description of the Psi values. (Keywords: Photodissociation, Iodine atoms, Laser fluorescence, Alkyl iodides.

DESCRIPTORS: (U) *ALKYL RADICALS, *IODIDES, *PHOTODISSOCIATION, ATOMS, DISPOSAL, DISSOCIATION, ENERGY, IODINE, LASER INDUCED FLUORESCENCE, PULSES, QUANTUM EFFICIENCY, RANGE(EXTREMES), SIZES(DIMENSIONS), REPRINTS.

IDENTIFIERS: (U) EXPORT CONTROL, WUAFOSR2303B1.

AD-A185 726

SEARCH CONTROL NO. EVJ50D

AD-A185 724 11/4

FLORIDA UNIV GAINESVILLE DEPT OF ENGINEERING SCIENCES

(U) Prediction of Material Damping of Laminated Polymer Matrix Composites.

DESCRIPTIVE NOTE: Rept. for Jun 83-Nov 85, 87

PERSONAL AUTHORS: Sun, C. T.; Wu, J. K.; Gibson, R. F.

CONTRACT NO. AFOSR-83-0154

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1323

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Materials Science, v22 p1006-1011, 1987.

ABSTRACT: (U) In this study the material damping of laminated composites is derived analytically. The derivation is based on the classical lamination theory in which there are eighteen material constants in the constitutive equations of laminated composites. Six of them are the extensional stiffness designated by A six of them are the coupling stiffness designated by B and the remaining six are the fleural stiffness designated by D. The derivation of damping of A, B, and D is achieved by first expressing A, B and D in terms of the stiffness matrix Q(k) and hk of each lamina and then using the relations of Qij(k) in terms of the four basic engineering constants EL, ET, GLT, and VLT. Next we apply elastic and viscoelastic correspondence principle by replacing EL, ET... by corresponding complex modules E*L, E*T,...,and A by A*, B by B* and D by D* and then equate the real parts and the imaginary parts respectively. Thus we have expressed Aij, Aij, Bij, and Dij, and Dij, in terms of the material damping N(k)L and N(k)T...of each lamina.

DESCRIPTORS: (U) *DAMPING, *COMPOSITE MATERIALS, *LAMINATES, COUPLING(INTERACTION), STIFFNESS, ELASTIC

AD-A185 724

AD-A185 724 CONTINUED

PROPERTIES, MATRIX MATERIALS, POLYMERS, THEORY, FLEXURAL PROPERTIES, PREDICTIONS, REPRINTS, VISCOELASTICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

IAC NO. PL-051225

IAC DOCUMENT TYPE: PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)ELASTIC ANALYSIS, CONSTITUTIVE RELATIONS, DAMPING, VISCOELASTICITY, LAMINATES, SHORT FIBER COMPOSITES, STIFFNESS, FLEXURAL PROPERTIES, POISSONS RATIO, THEORY, GRAPHITE FIBER/EPOXY, COMPOSITES, GRAPHITE FRP/EPOXY, COUPLING EFFECTS, ZZ UNLIMITED.;

AD-A185 716 9/5 20/12 9/1

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MECHANICAL ENGINEERING AERONAUTIC AL ENGINEERING AND MECHANICS

(U) Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 May 87,

JUL 87 71P

PERSONAL AUTHORS: Tiersten, Harry F.

CONTRACT NO. AFOSR-84-0351

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR
TR-87-1233

UNCLASSIFIED REPORT

ABSTRACT: (U) Trapped energy modes in the piezoelectric thin film on semiconductor composite resonator are explained and contrasted with modes that do not trap energy. The results of calculations of the quality factor of the fundamental essentially thickness-extensional mode in the composite resonator due to radiation into the bulk semiconductor wafer are discussed. The combination of materials considered was aluminum-nitride on gallium-arsenide. The calculations show that when trapping is not present the quality factor is a very rapidly varying function of the ratio of the composite resonator thickness to the wafer thickness and that the range of variation is very large, i.e., between one and two orders of magnitude. The calculations also reveal that when trapping is present the quality factor is always much larger and its range of variation with thickness ratio much smaller than when trapping is not present. The direct calculation procedure is required to check the accuracy of a perturbation procedure. The perturbation procedure for the calculation of the quality factor of the composite resonator due to radiation into the semiconductor wafer is discussed. The perturbation procedure enables calculations for the case of rectangular electrodes and diaphragms to be performed.

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AD-A185 716

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 716 CONTINUED

For the strip case the calculations of the quality factor using the perturbation procedure are in good agreement with the results obtained from the earlier more cumbersome direct procedure.

DESCRIPTORS: (U) *BULK SEMICONDUCTORS, *GALLIUM ARSENIDES, *PIEZOELECTRIC MATERIALS, *RESONATORS, *SEMICONDUCTOR DEVICES, ACCURACY, COMPUTATIONS, ELECTRODES, ENERGY, MATERIALS, NUMERICAL METHODS AND PROCEDURES, PERTURBATIONS, QUALITY, RATIOS, RECTANGULAR BODIES, THICKNESS, THIN FILMS, TRAPPING(CHARGED PARTICLES), TRAPS, VARIATIONS, WAFERS, WAVE PROPAGATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B2.

AD-A185 715 7/5 20/5

VICTORIA UNIV OF MANCHESTER (ENGLAND) DEPT OF CHEMISTRY

(U) The Kinetics and Dynamics of Iodine Monofluoride Formation in Gas-Phase Collisions.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Dec 85-30 Nov 86,

JUN 87 7P

PERSONAL AUTHORS: Whitehead, J. C.

CONTRACT NO. AFOSR-85-0039

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1201

UNCLASSIFIED REPORT

ABSTRACT: (U) Chemiluminescence has been studied for the reactions of fluorine atoms with a range of inorganic iodides. From the form of the resulting IF(B) vibrational state distributions, it is concluded that in all F/iodide systems IF(B) is produced by the recombination of a fluorine atom with an excited iodine atom. This is supported by the results of VUV laser-fluorescence probing and kinetic modelling. Keywords: Chemiluminescence, Iodine monofluoride, Iodine atoms, Fluorine atoms, Chemical laser, Laser fluorescence.

DESCRIPTORS: (U) *CHEMILUMINESCENCE, *FLUORIDES, *IODINE, *PARTICLE COLLISIONS, *VAPOR PHASES, ATOMS, CHEMICAL LASERS, DYNAMICS, FLUORINE, IODIDES, IODINE COMPOUNDS, LASER INDUCED FLUORESCENCE, CHEMICAL REACTIONS, METASTABLE STATE, KINETIC ENERGY, MODELS, PHOTOLYSIS.

IDENTIFIERS: (U) Atom atom interactions, PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 712 20/4 21/5

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG
CENTER FOR TURBOMACHINERY AND PROPULSION RESEARCH

(U) Post Stall Behavior in Axial-Flow Compressors.

DESCRIPTIVE NOTE: Final rept. Mar 83-Jan 87,

AUG 87 67P

PERSONAL AUTHORS: O'Brien, Walter F.

REPORT NO. WFOB/87-0801

CONTRACT NO. F49620-83-K-0024

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-87-1195

UNCLASSIFIED REPORT

ABSTRACT: (U) A multi-element research program was conducted to improve understanding of the role of cascade losses in compressor post-stall behavior. Experiments in a special wind tunnel designed for high-angle-of-attack investigations included surface and smoke flow visualizations and hot film anemometer velocity measurements. Results showed the details of the stall development in a cascade, and the effect of stagger on measured flow losses. Predictions of a Navier-Stokes model for separated cascade flows were compared with experimental results. An improved compressor stage model predicts post-stall characteristics, and illustrates the application of the results to compression system analysis. Keywords: Cascades (Fluid dynamics); Flow measurements; Stalling behavior; Propagating stalls.

DESCRIPTORS: (U) *AXIAL FLOW COMPRESSORS, *CASCADES(FLUID DYNAMICS), *STALLING, ANGLE OF ATTACK, CASCADE STRUCTURES, COMPRESSION, COMPRESSORS, FLOW, FLOW SEPARATION, FLOW VISUALIZATION, FLUID DYNAMICS, LOSSES, MEASUREMENT, MODELS, NAVIER STOKES EQUATIONS, SMOKE, SYSTEMS ANALYSIS, WIND TUNNELS, GAS TURBINES, JET ENGINES, MATHEMATICAL PREDICTION, PROPAGATION.

AD-A185 712 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 711 6/1 6/11

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Effects of Hydrazines upon Cyclic Nucleotide Regulated Neuronal Processes.

DESCRIPTIVE NOTE: Final technical rept. 15 Jul 83-14 Jul 86,

JUL 87 64P

PERSONAL AUTHORS: Rasenick, Mark M.

CONTRACT NO. AFOSR-83-0249

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-87-1310

UNCLASSIFIED REPORT

ABSTRACT: (U) . The funded project was designed, initially to explore the effects of hydrozines upon cyclic nucleotide regulated neuronal processes. Cyclase as it was discovered that hydrazines were potent activators of this enzyme. In order to understand hydrazine actions in the CNS, it was required that more basic knowledge of the adenylate cyclase cascade by accumulated and this study probed some of the distinctions between neural and non-neural adenylate cyclase with that in mind. Specifically, the following has been accomplished during the project period: Interactions between the cytoskeleton and synaptic membrane adenylate cyclase have been probed and we have found a reversible attachment between the GTP-binding proteins regulating adenylate cyclase and that membrane. We have discovered that GTP binding proteins directly interact and may exchange nucleotide with one another, and have hypothesized this mechanism as an intracellular regulator of signal transduction. We have discovered a novel, neural GTP binding protein and are in the process of purification and characterization. We have devised a method for measuring adenylate cyclase in monolayers of permeable cells and have used this method to explore the coupling between receptors and adenylate cyclase GTP-binding proteins. It is hoped that an increased understanding of the neuronal adenylate cyclase

AD-A185 711

AD-A185 711 CONTINUED

system will lead to an increased understanding of the effects of certain neurotoxins, and to the design of strategies to prevent and/or treat the effects of those compounds.

DESCRIPTORS: (U) *ADENYL CYCLASE, *HYDRAZINES, *NERVE CELLS, *PROTEINS, *TOXICITY, ACTIVATION, ATTACHMENT, CELL STRUCTURE, CELLS(BIOLOGY), CHEMICAL BONDS, ENZYMES, EXCHANGE, FIBERS, NERVOUS SYSTEM, NUCLEOTIDES, POTENCY, PURIFICATION, REGULATORS, REVERSIBLE, SIGNALS, SYNAPSE, TOXINS AND ANTITOXINS, CYCLIC COMPOUNDS, GUANOSINE, NERVE TRANSMISSION, NERVE IMPULSES, MEMBRANES(BIOLOGY).

IDENTIFIERS: (U) Quanosine triphosphate, Adenylate cyclase, Neurotoxins, PE61102F, WUAFOSR2312A5.

AD-A185 711

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 710 7/5 20/5

VICTORIA UNIV OF MANCHESTER (ENGLAND) DEPT OF CHEMISTRY

(U) Chemiluminescent Reactions of Fluorine Atoms with Organic Iodides in the Gas Phase. Part 1. Iodomethanes,

87 12P

PERSONAL AUTHORS: Braynis, Helen S.; Raybone, David; Whitehead, J. C.

CONTRACT NO. AFOSR-85-0039

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1200

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Faraday Transactions 2, v83 p627-637 1987.

ABSTRACT: (U) Visible chemiluminescence in the region 200-900 nm was measured for the reactions of Fluorine atoms with methane, methyliodide, CD3I, CH2I2, CHI3 and CI4 studied at reduced pressure (ca. 0.6 mbar). Emission was observed from electronically excited IF (B), HCF (A), CH (A) and C2 (d) and from vibrationally excited HF. Vibrational populations and rotational temperatures were obtained for the diatomic emitters. The reaction F + CI4 was found to produce IF (B) with a non-thermal vibrational population distribution that has excess population in the higher vibrational levels. Possible mechanisms for the formation of the emitters are discussed.Keywords: Chemiluminescence, Iodine monofluoride, Organic Iodides.

DESCRIPTORS: (U) *ATOMS, *CHEMILUMINESCENCE, *FLUORINE, *IODINE COMPOUNDS, *METHANE, *VAPOR PHASES, *ATOMIC ENERGY LEVELS, *MOLECULAR VIBRATION, CHEMICAL REACTIONS, DIATOMIC MOLECULES, EMITTERS, FLUORIDES, IODIDES, PRESSURE, REDUCTION, ROTATION, TEMPERATURE, VIBRATION, VISIBLE SPECTRA, REPRINTS.

IDENTIFIERS: (U) Atom molecule interactions, PE61102F, WUAFOSR2303131.

AD-A185 710

AD-A185 701 12/5

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Fault Diversity in Software Reliability,

87 14P

PERSONAL AUTHORS: Boland, Philip J.; Proschan, Frank; Tong, Y. L.

REPORT NO. FSU-STATISTICS-M714, TR-85-185

CONTRACT NO. F49620-82-K-0007, $NSF-DMS85-02346

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1024

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability in the Engineering and Informational Sciences, v1 p175-188 1987. Supersedes report dated Sep 85, AD-A162 757.

ABSTRACT: (U) Diversity of bugs or faults in a software system is a factor contributing to software unreliability which has not yet been appropriately emphasized. This paper is written with the intention of demonstrating the impact of fault diversity on the time to detection of software bugs. A new discrete software reliability model based on the multinomial distribution is introduced. It is shown that for models of this type, the more diverse the fault probabilities are, the longer it takes to detect or eliminate any n faults, while the smaller will be the number of faults detected or eliminated during a given amount of time (or during a given number of inputs to the system). The impact of fault diversity is also demonstrated for the Jelinksi-Moranda model. (Author)

DESCRIPTORS: (U) *COMPUTER PROGRAM RELIABILITY, *FAULTS, COMPUTER PROGRAMS, DETECTION, REPRINTS, IMPACT, PROBABILITY, TIME, MATHEMATICAL MODELS.

IDENTIFIERS: (U) *Fault diversity, PE61102F, WUAFOSR2304A5.

AD-A185 701

AD-A185 695 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strong Consistency and Exponential Rate of the 'Minimum L1-Norm' Estimates in Linear Regression Models.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 27P

PERSONAL AUTHORS: Wu, Yuehua

REPORT NO. 87-18

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0976

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers a linear regression model, where (x sub i) is a sequence of experimental points, i. e., known p-vectors, (e sub i) is a sequence of independent random errors, with med(e sub i) =0,i= 1,2....Define the minimum L1 -norm estimate of (alpha, beta)', by (alpha, beta)', to be chosen such that under quite general conditions on (x sub i) and (e sub i), the strong consistency of the minimum L1 -norm estimate is established. Further, under an additional condition on (x sub i), it is also proved that for any given epsilon > 0, there exist constant C > 0 not depending on n.

DESCRIPTORS: (U) *LINEAR REGRESSION ANALYSIS, *MATHEMATICAL MODELS, *ESTIMATES, ERRORS, EXPONENTIAL FUNCTIONS, RATES, NORMAL DISTRIBUTION, CONSISTENCY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 695

AD-A185 693 12/4

MISSOURI UNIV-ROLLA DEPT OF MATHEMATICS AND STATISTICS

(U) On the Mean Time between Failures for Repairable Systems,

OCT 86 6P

PERSONAL AUTHORS: Engelhardt, Max; Bain, Lee J.

CONTRACT NO. AFOSR-84-0164

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-87-1030

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Reliability, vR-35 n4 p419-422 Oct 86.

ABSTRACT: (U) Much of the recent work on modeling repairable systems involves Poisson processes with nonconstant intensity functions, viz, nonhomogeneous Poisson processes. Since times between failures are not identically distributed when the proc ess is nonhomogeneous, it is not clear what concept should take the place of the mean time between failures in assessing the reliability of a repairable system. A number of alternate concepts can be found in the literature. We investigate the relationship between two of the most frequently considered alternatives; the reciprocal of the intensity function, and the mean waiting time from i until the next failure. Theorem 1 states a necessary and sufficient condition for the mean time until the next failure to be asymptotically proportional to the reciprocal of the intensity function. Some examples, including the familiar log-linear and power-intensity processes satisfy this condition. A monotonicity property is also established between these two concepts which could be used to obtain conservative statistical confidence limits for the mean time until the next failure, based on results which are already available for the intensity function of the power-intensity process. However, further study of concepts such as the rate of convergence would be needed in order to determine the

AD-A185 693

AD-A185 693 CONTINUED

degree of approximation of the nominal confidence level to the actual level. Until more is known about the mean time from t until the next failure, it would be advisable to use the reciprocal of the intensity function, which has been studied more extensively, as the basis of reliability assessment for a repairable system. (Reprints)

DESCRIPTORS: (U) *RELIABILITY, *REPAIR, *MATHEMATICAL MODELS, CONFIDENCE LEVEL, CONFIDENCE LIMITS, CONVERGENCE, INTENSITY, MEAN, MODELS, RATES, REPRINTS, STATISTICS, TEST AND EVALUATION, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K3.

AD-A185 693

AD-A185 689 6/5 6/4 5/2

HARVARD MEDICAL SCHOOL BOSTON MA

(U) Continuous Vigilance Simulator with Real-Time Neuroendocrine Correlation.

DESCRIPTIVE NOTE: Final rept. 15 Jul 83-28 Feb 85,

JUL 87 7P

PERSONAL AUTHORS: Czeisler, Charles A.

CONTRACT NO. AFOSR-83-0309

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR TR-87-1232

UNCLASSIFIED REPORT

ABSTRACT: (U) A Continuous Electroencephalographic and Physiologic Monitoring System was configured using a VAX11/750 control unit. The system combines three important and interrelated functions: monitoring the health and safety of human research subjects during long-term studies; scheduling and recording discrete events such as meal times, bedtimes, and performance test times; and collecting physiologic data from th subject. Keywords: Data acquisition, Data processing equipment, Neuroendocrine system, Endocrine system, Simulators, Computer modeling, Physiological monitoring, Electorencephalography.

DESCRIPTORS: (U) *ELECTROENCEPHALOGRAPHY, *INTERACTIONS, *MONITORS, *BIOMEDICAL INFORMATION SYSTEMS, COMPUTERIZED SIMULATION, CORRELATION, DATA ACQUISITION, DATA PROCESSING EQUIPMENT, ENDOCRINE GLANDS, HUMANS, MEALS, MONITORING, NEUROLOGY, PERFORMANCE TESTS, PERFORMANCE(HUMAN), PHYSIOLOGY, REAL TIME, SAFETY, SIMULATORS, TIME, VIGILANCE, ELECTROPHYSIOLOGY, MEDICAL RESEARCH, CONTROLLED ATMOSPHERES, CIRCADIAN RHYTHMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

AD-A185 689

AD-A135 688 6/1 6/4

NORTHWESTERN UNIV EVANSTON IL

(U) Phosphoprotein Regulation of Synaptic Reactivity.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Jun 87,

AUG 87 7P

PERSONAL AUTHORS: Routtenberg, Aryeh

CONTRACT NO. AFOSR-84-0260

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-87-1231

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant provided equipment for multi-user, multi-tasking minicomputer (VAX 11-750) and a cluster of micro-computers (IBM-XT) to support a DoD funded this research project investigated the regulation of neurobiological responsiveness. High speed digitization of neurophysiological signals and their analysis were performed on-line using IBM-XT installed A-D conversions. In our research program we seek to determine how the phosphorylation state of identified brain proteins regulates inter-synaptic changes in communication between nerve cells, monitored electrophysiologically at the synapse using microelectrodes.

DESCRIPTORS: (U) *NERVE IMPULSES, *NEUROPHYSIOLOGY, *PHOSPHORYLATION, *PROTEINS, *SYNAPSE, ANALOG TO DIGITAL CONVERTERS, BRAIN, ELECTRODES, NERVE CELLS, COMPUTER APPLICATIONS, ELECTROENCEPHALOGRAPHY, NERVE TRANSMISSION, GANGLIA, MINICOMPUTERS, MICROCOMPUTERS, SIGNALS.

IDENTIFIERS: (U) Phosphoproteins, PE61102F, WUAFOSR2917A4.

AD-A185 688

AD-A185 687 17/5

PENNSYLVANIA UNIV PHILADELPHIA SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) A Query Driven Computer Vision System: A Paradigm for Hierarchical Control Strategies during the Recognition Process of Three Dimensional Visually Perceived Objects.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-31 Dec 86,

APR 83 154P

PERSONAL AUTHORS: Bajesky,

CONTRACT NO. F49620-83-K-0037

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1205

UNCLASSIFIED REPORT

ABSTRACT: (U) Two necessary components of any image understanding system are on object recognizer and a symbolic scene representation. The LandScan system currently being designed is a query driven scene analyzer in which the user's natural language queries will focus the analysis to pertinent regions of the scene. This is different than-many image understanding systems which present a symbolic description of the entire scene regardless of what portions of that picture are actually of interest. In order to facilitate such a focussing strategy, the high level analysis which includes reasoning and recognition must proceed using a top-down flow of control, and the representation must reflect the current sector of interest. In order to facilitate such a focussing strategy, the high level analysis which includes reasoning and recognition must proceed using a top-down flow of control, and the representation must reflect the current sector of interest. This paper proposes the design for a goal-oriented object recognizer and a dynamic scene representation for LandScan a system to analyze aerial photographs of urban scenes. The recognizer is an ATN in which the grammar describes sequence of primitives which define objects. The Scene

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

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Model is dynamically built as the objects specified by the queries are recognjzed. Thus the control of the scene modelling is top-down, reflecting the user's interest in the scene. The Scene Model represents both the objects in the image and primitive spatial relations between these objects. Keywords: Computer vision, Computer architecture. (Author)

DESCRIPTORS: (U) *IMAGE PROCESSING, AERIAL PHOTOGRAPHS, ANALYZERS, COMPUTERS, CONTROL, DYNAMICS, FLOW, FOCUSING, HIERARCHIES, INTERROGATION, NATURAL LANGUAGE, REASONING, RECOGNITION, SPATIAL DISTRIBUTION, STRATEGY, SYMBOLS, URBAN AREAS, VISION, OPTICAL DETECTION, COMPUTER APPLICATIONS, PHOTOGRAPHIC IMAGES.

IDENTIFIERS: (U) *Computer vision, *Scene analysis, PE61102F, WUAFOSR2304A1.

AD-A185 687

AD-A185 674 21/3

SEITEC INC CLEVELAND OH

(U) Completely Magnetically Contained Electrothermal Thrusters.

DESCRIPTIVE NOTE: Final technical rept. Sep 84-Aug 85,

JUL 87 47P

PERSONAL AUTHORS: Seikel, George R.; Franks, Clifford V.

REPORT NO. SEITEC-8715

CONTRACT NO. F49620-84-C-0114

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-87-1164

UNCLASSIFIED REPORT

ABSTRACT: (U) Conceptual designs of potentially attractive high-performance thrusters are defined. These are a kw steady-state radiation-cooled DC thruster and a MW quasi-steady DC thruster. These thrusters offer the potential for long operating life with low erosion rates and 50 to 100% improvements in performance over prior plasma thrusters. The kw thruster would be a prototype of a radiation-cooled electric thruster for future electric propulsion missions. The MW thruster would be an inexpensive experiment to define the potential of subsequent very-high power, steady-state thrusters which would utilize superconducting magnets. The kw thruster would use xenon propellent and the MW thruster would use argon propellent. Both should operate at efficiencies of 50 to 80% in the 2500 to 3000 second specific impulse range. Keywords include: Electric propulsion; Plasma, Electrothermal, and MPD thrusters.

DESCRIPTORS: (U) *THRUSTERS, *ELECTRIC PROPULSION, COOLING, DIRECT CURRENT, ELECTRIC PROPULSION, EROSION, LOW RATE, MAGNETS, PERFORMANCE(ENGINEERING), PLASMA ENGINES, RADIATION, STEADY STATE, SUPERCONDUCTORS, XENON, ARGON, MAGNETIC FIELDS, CONTAINMENT(GENERAL), MAGNETOHYDRODYNAMICS.

AD-A185 674

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 674 CONTINUED

IDENTIFIERS: (U) Electrothermal thrusters, PE65502F, WUAFOSR3005A1.

AD-A185 666 9/5 20/5 20/6

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA CRYSTAL AND DEVIC E RESEARCH DEPT

(U) Program to Development an Optical Transistor and Switch.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-1 Mar 87,

JUL 87 85P

PERSONAL AUTHORS: Henningsen, T.; Garbuny, M.; Hopkins, R. H.

REPORT NO. 87-9F4-NUTRN-R1

CONTRACT NO. F49620-84-C-0103

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-87-1309

UNCLASSIFIED REPORT

ABSTRACT: (U) The Optical Transistor and Switch, for which concepts and designs were developed under this program, is a device in which a radiation beam of one wavelength is controlled by a beam of a second wavelength. In contrast to other optical transistors and switches, this arrangement keeps the requirements for control and signal independent and thus adds another dimension to design. The basic device provides simply an optical path through a medium which consists of of free three-energy level atoms such as sodium vapor at very low pressures. It provides, with relatively low optical powers, satisfactory switching action and transistor saturation gains of 3-10. A subsequent concept is that of Multistate Optical Transistors based on spectroscopically complementary materials. Very high transistor gains can be achieved with two variations of this concept. However, the higher optical power demand and the stringent requirement of double resonance between two materials are important drawbacks. The third concept is the Quantum Transition Etalon which consists of a Fabry-Perot cavity enclosing the three-level medium. The QTE appears to have substantially the advantages of the two former concepts,

AD-A185 666 CONTINUED

but none of their limitations.

DESCRIPTORS: (U) *FABRY PEROT INTERFEROMETERS, *OPTICAL PROPERTIES, *SODIUM, *SWITCHING, *TRANSISTORS, *TRANSITIONS, CAVITIES, FREQUENCY, LOW PRESSURE, MATERIALS, OPTICS, PATHS, POWER, QUANTUM THEORY, RADIATION, SATURATION, SIZES(DIMENSIONS), VAPORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A185 662 20/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF AEROSPACE ENGINEERING

(U) Studies of Unsteadiness in Boundary Layers.

DESCRIPTIVE NOTE: Annual rept. 1 May 86-30 Apr 87,

JUN 87 11P

PERSONAL AUTHORS: Blackwelder, Ron; Kaplan, R. E.; Ho, Chih-Ming; Huerre, Patrick; Redekopp, Larry G.

CONTRACT NO. F49620-85-C-0080

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1405

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental and theoretical efforts aimed at clarifying and revealing important dynamical features of several turbulent shear flows are described. The flows studied include boundary layers, jets, wakes and separated flows on lifting surfaces. Significant progress has been made through experimental studies toward understanding: (i) processes in turbulent boundary layers responsible for the production of turbulent energy via local, inflectional-instability events and the modification of boundary layer growth and entrainment by passive large-eddy manipulation devices; (ii) procedures for enhancing entrainment and mixing in jets either by actively forcing the flow or by passively contouring the jet exit; and (iii) characteristics of boundary layer separation and its control on lifting surfaces in unsteady flows. Theoretical studies on the temporal and spatial structure in blunt-body wakes have revealed the necessary conditions under which global, self-sustained oscillations appear and, also, have provided firm criteria for specifying the frequency of these oscillations. The results are consistent with existing experimental evidence and suggest promising approaches for drag modifications for flow over bluff bodies. Several experimental facilities have been designed. Keywords: Separated flows; Unsteady flows; Turbulent

AD-A185 662 CONTINUED

shear flows.

DESCRIPTORS: (U) *LIFTING SURFACES, *SHEAR PROPERTIES, *TURBULENT BOUNDARY LAYER, *UNSTEADY FLOW, BOUNDARY LAYER, DRAG, FLOW SEPARATION, GROWTH(GENERAL), MODIFICATION, OSCILLATION, PRODUCTION, RESEARCH FACILITIES, SELF OPERATION, TURBULENT FLOW, WAKE, AERODYNAMIC DRAG, BLUNT BODIES, EXPERIMENTAL DESIGN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

AD-A185 659 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Addition Reactions of Two Disilenes,

87 26P

PERSONAL AUTHORS: De Young, Douglas J.; Fink, Mark J.; West, Robert; Michl, Josef

CONTRACT NO. F49620-83-C-0044, $NSF-CHE83-18820

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1524

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Main Group Metal Chemistry, v10 n1 p19-43 1987.

ABSTRACT: (U) Addition reactions of tetramesityldisilene, 1, and trans-1, 2-di-tert-butyl-1-2-dimesityl-disilene, 2, are reported. Hydrogen chloride, halogens, alcohols and water add across the silicon-silicon double bond of 1 or 2. With certain acetylenes 1 and 2 undergo 2+2 cycloadditions to form 1,2-disilacyclobuteness. Chlorine adds to 2 to give only one stereoisomer but all other reactions of 2 produced diastereomeric mixtures.

DESCRIPTORS: (U) *ADDITION REACTIONS, *SILICON COMPOUNDS, ALCOHOLS, BONDING, CHLORINE, HALOGENS, HYDROGEN CHLORIDE, REPRINTS, SILICON, SILICON DIOXIDE, WATER, RECRYSTALLIZATION, CYCLIC COMPOUNDS, CYCLOHEXANES, PHOTOLYSIS, STEREOCHEMISTRY, NUCLEAR MAGNETIC RESONANCE, CHEMICAL BONDS, ACETYLENES, METHYL RADICALS, PHENYL RADICALS, HYDROXIDES, ISOMERS, CROSSLINKING(CHEMISTRY).

IDENTIFIERS: (U) *Disilenes, *TRANS-1-2-di-tert-butyl-1-1-2-dimethyl-disilenes, disilene/trans-1-2-di-tert-butyl-1-2-dimethyl, Chemical bridges, PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 656 12/1 12/5

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Review of 'Multidimensional Systems Theory.'

DESCRIPTIVE NOTE: Rept. for 14-15 Jul 87,

JUL 87 6P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1163

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear Algebra and Its Applications, v87 p273-278 1987.

ABSTRACT: (U) Few parts of applications-oriented mathematics have benefited from the interaction with modern algebraic and analytic geometry as much as the area usually referred to as multidimensional systems theory. This field consists of the study of various topics in the theory of functions of several complex variables, motivated mostly by problems in network design and synthesis and by signal-processing applications. Because of finite realizability constraints, the focus is often on rational functions; this accounts for the strong algebraic flavor of papers in the area, and in particular the use of techniques and results from commutative algebra. A linear-algebraic components is introduced by the need to consider matrices whose entries are analytic or rational functions. Multidimensional systems appear when dealing instead with partial differential (or difference) equations. The independent variables may now represent different space coordinates (as in image processing applications), or perhaps mixed time and space variables (as in seismic data processing). Multidimensional models are also useful when studying certain types of functional differential equations in one independent variable, as delay-differential systems.

AD-A185 656

AD-A185 656 CONTINUED

DESCRIPTORS: (U) *DATA PROCESSING, *IMAGE PROCESSING, *NUMERICAL ANALYSIS, ALGEBRA, ALGEBRAIC GEOMETRY, ANALYTIC FUNCTIONS, ANALYTIC GEOMETRY, COMPLEX VARIABLES, DIFFERENTIAL EQUATIONS, EQUATIONS, FUNCTIONAL ANALYSIS, MIXING, MODELS, NETWORKS, RATIONAL FUNCTIONS, SEISMIC DATA, SYNTHESIS, THEORY, TIME, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A185 656

AD-A185 646 20/11

MARYLAND UNIV COLLEGE PARK

(U) Stability Analysis of a Rigid Body with a Flexible Attachment Using the Energy-Casimir Method,

87 22P

PERSONAL AUTHORS: Posbergh, Thomas A.; Krishnaprasad, P. S.; Marsden, Jerrold E.

CONTRACT NO. AFOSR-87-0073, $NSF-OIR85-00108

MONITOR: AFOSR
TR-87-1385

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors consider a system consisting of a rigid body to which a linear extensible shear beam is attached. For such a system the Energy-Casimir method can be used to investigate the stability of the equilibria. In this case, it can be shown that a test for (formal) stability reduces to checking the positive definiteness of two matrices which depend on the parameters of the system and the particular equilibrium about which the stability is to be ascertained. Keywords: Computations; Variations; Configurations. (Author)

DESCRIPTORS: (U) *ATTACHMENT, *BEAMS(STRUCTURAL), *EQUATIONS OF MOTION, COMPUTATIONS, RIGIDITY, SHEAR PROPERTIES, STABILITY, POISSON EQUATION.

IDENTIFIERS: (U) Energy Casimir method.

AD-A185 646

AD-A185 645 12/3

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

(U) Multivariate Nonparametric Classes in Reliability.

DESCRIPTIVE NOTE: Technical rept.,

JAN 85 16P

PERSONAL AUTHORS: Block, Henry W.; Savits, Thomas H.

REPORT NO. TR-85-01

CONTRACT NO. N00014-84-K-0084, $AFOSR-84-0113

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0979

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper examines multivariate nonparametric classes and methods in reliability. Hollander and Proschan (1984) described the various univariate nonparametric classes in reliability. The classes of adverse aging described include the IFR, IFRA, NBU, NBUE, and DMRL classes. The dual classes of beneficial aging are also covered. Several new univariate classes have been introduced since that time. One that this document briefly mentions is the HNBUE class, since we are aware of several multivariate generalizations of this class. The univariate classes in reliability are important in applications concerning systems where the components can be assumed to be independent. In this case the components are often assumed to experience wearout or beneficial aging of a similar type. For example, it is often reasonable to assume that components have an increasing failure rate (IFR). In making this IFR assumption it is implicit that each component separately experiences wear and no interactions among components can occur. However in many realistic situations, adverse wear on one component will promulgate adverse wear on other components. From another point of view a common environment will cause components to behave similarly. In either situation, it is clear that an assumption of independence on the components would be valid.

AD-A185 645

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 645 CONTINUED

Consequently multivariate concepts of adverse or beneficial aging are required.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *RELIABILITY, *NONPARAMETRIC STATISTICS, ADVERSE CONDITIONS, AGING(MATERIALS), FAILURE, RATES, VARIATIONS, WEAR.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A185 643 20/4

YALE UNIV NEW HAVEN CT MASON LAB

(U) Turbulence, Turbulence Control, and Drag Reduction.

DESCRIPTIVE NOTE: Final technical rept. Aug 82-Aug 85,

AUG 87 101P

PERSONAL AUTHORS: Sreenivasan, K. R.

CONTRACT NO. AFOSR-82-0299

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-0984

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is reported on fundamental studies in turbulence dynamics, flow control, and drag reduction. Contents: On anologies between turbulence in unconfined flows and chaotic dynamical systems; Transition and turbulence in fluid flows, and low-dimensional chaos; Chaos in open flow systems; The fractal facets of turbulence; Transition intermittency in open flows, and intermittency routes to chaos; An instability associated with a sudden expansion in a pipe flow; and On the scaling of the turbulence energy dissipation rate.

DESCRIPTORS: (U) *DRAG REDUCTION, *PIPES, *TURBULENCE, *CHANNEL FLOW, *BOUNDARY LAYER CONTROL, CONTROL, DISSIPATION, DYNAMICS, ENERGY, FLOW, FLUID FLOW, RATES, FLUID DYNAMICS.

IDENTIFIERS: (U) Pipe flow, Chaos, PE62202F, WUAFOSR2307A2.

AD-A185 645

AD-A185 643

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 635 12/4

CLEMSON UNIV SC

(U) Algebraic Methods Applied to Network Reliability Problems,

APR 87 13P

PERSONAL AUTHORS: Shier, Douglas R.; Whited, David E.

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-0996

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Algebraic and Discrete Methods, v8 n2 p251-262 Apr 87.

ABSTRACT: (U) An algebraic structure underlying network reliability problems is presented for determining the 2-terminal reliability of directed networks. An iterative algorithm is derived from this algebraic perspective to solve the (s, j)-terminal reliability problem simultaneously for all nodes j. In addition to providing an exact answer (in the form of a reliability polynomial), the algorithm also yields a nondecreasing sequence of approximate solutions guaranteed to be lower bounds on the exact solution. Empirical results, presented for two different implementations of the algorithm, show that useful approximate solutions can be obtained in a reasonable amount of computation time.

DESCRIPTORS: (U) *ALGEBRA, *NETWORKS, *RELIABILITY, *APPLIED MATHEMATICS, ALGORITHMS, COMPUTATIONS, ITERATIONS, POLYNOMIALS, SEQUENCES, SOLUTIONS(GENERAL), TIME, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 635

AD-A185 633 12/2

WASHINGTON UNIV SEATTLE

(U) Some Central Limit Theorems for Markov Paths and Some Properties of Gaussian Random Fields,

87 48P

PERSONAL AUTHORS: Adler, Robert J.; Epstein, R.

CONTRACT NO. F49620-C-85-0114, $AFOSR-85-0384

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1125

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic Processes and Their Applications, v24 p157-202 1987.

ABSTRACT: (U) The Authors' primary aim is to build versions of generalised Gaussian processes from simple, elementary components in such a way that as many as possible of the esoteric properties of these elusive objects become intuitive. For generalised Gaussian processes, or fields, indexed by smooth functions or measures on IR sub d, our building blocks will be simple Markov processes whose state space is IR sub d. Roughly speaking, by summing functions of the local times of the Markov processes the Gaussian field shall be obtained via a central limit theorem type of result. This central limit result, together with related results indicating how additive functionals of the Markov processes generate additive functionals of the fields, yield considerable insight into properties of generalised Gaussian processes such as Markovianess, self-similarity, locality, of functionals, etc. Although the paper is comprised primarily of new results, and despite the fact that the subject matter is somewhat esoteric, our aims are primarily didactic and expository - we want to try to initiate the uninitiated into some of the mysteries of generalised processes via an easily understood model.

DESCRIPTORS: (U) *MARKOV PROCESSES, LIMITATIONS, MODULAR CONSTRUCTION, STATISTICAL PROCESSES, THEOREMS, REPRINTS,

AD-A185 633

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 633 CONTINUED

QUANTUM THEORY, FIELD THEORY.

IDENTIFIERS: (U) Gaussian processes, Sobolev space, Euclidean quantum field theory, PE61102F, WUAFOSR2304A5.

AD-A185 632 7/4

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MATHEMATICS

(U) A Decomposition of the Brownian Path.

DESCRIPTIVE NOTE: Journal article,

MAR 87 8P

PERSONAL AUTHORS: Karatzas, Ioannis; Shreve, Steven

CONTRACT NO. F49620-85-C-0144, $AFOSR-85-0360

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-87-1248

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Statistics and Probability* Letters, v5 n2 p87-93 Mar 87.

ABSTRACT: (U) The Brownian path (omega(s) ; 0 < or = s < or = t) is dissected and then reassembled in such a way that (1) the last visit gamma sub t at the origin, as well as the fragment (w omega(s) ; gamma sub t , or = t), are left invariant; (2) on 0, gamma sub t, local time becomes maximum-to-date and occupation time of I R sub + becomes location of maximum; and (3) the resulting process is again Brownian. Characterization of conditional processes are employed to establish the result: Several consequences of the latter are discussed. Keywords: Brown motion; Continuous functions, Uniform convergence). (Author)

DESCRIPTORS: (U) *BROWNIAN MOTION, CONTINUITY, CONVERGENCE, DECOMPOSITION, FUNCTIONS, JOBS, PATHS, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 631 20/4 12/5

INSTITUTE FOR SCIENTIFIC COMPUTING FORT COLLINS CO

(U) Multitasked Embedded Multigrid for Three-Dimensional Flow Simulation.

DESCRIPTIVE NOTE: Final rept.,

JUN 86 8P

PERSONAL AUTHORS: Johnson, Gary M.; Swisshelm, Julie M.; Pryor, Daniel V.; Ziebarth, John P.

CONTRACT NO. AFOSR-85-0289

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1287

UNCLASSIFIED REPORT

ABSTRACT: (U) This project explored fast algorithms for Euler and Navier Stokes simulations. A particular issue pursued under the grant was the integration of an explicit three dimensional flow solver, embedded mesh refinements, a model equation hierarchy, multiple grid acceleration and extensive rectorization and multi tasking. Several papers were produced during this effort including such titles as 'Multitasked embedded multigrid for three-dimensional flow simulation' and 'Multigrid approaches to the Euler equations'. An efficient algorithm designed to be used for Navier stokes simulations of complex flows over complete configurations is described. The algorithm incorporates a number of elements, including an explicit three-dimensional flow solver, embedded mesh refinements, a model equation hierarchy ranging from the Euler equations through the full Navier-Stokes equations, multiple-grid convergence acceleration and extensive vectorization and multitasking for efficient execution on parallel processing supercomputers. Results are presented for a preliminary trial of the method on a problem representative of turbomachinery applications. Based on this performance data, it is estimated that a mature implementation of the algorithm will yield overall speedups ranging as high as 100.

AD-A185 631

AD-A185 631 CONTINUED

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, *THREE DIMENSIONAL FLOW, *COMPUTERIZED SIMULATION, ACCELERATION, ALGORITHMS, DIFFERENTIAL EQUATIONS, EFFICIENCY, EMBEDDING, FLOW, GRIDS, HIERARCHIES, MATHEMATICAL MODELS, MESH, PARALLEL PROCESSING, SUPERCOMPUTERS, TURBOMACHINERY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A185 631

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 630 12/2 20/3

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF MATHEMATICS

(U) Variation of Wave Action: Modulations of the Phase Shift for Strongly Nonlinear Dispersive Waves with Weak Dissipation. A New Adiabatic Invariant Involving the Modulated Phase Shift for Strongly Nonlinear, Slowly Varying, and Weakly Damped Oscillators. The Modulated Phase Shift for Weakly Dissipated Nonlinear Oscillatory Waves of the Korteweg-de Vries Type,

SEP 87 84P

PERSONAL AUTHORS: Bourland, F. J.; Haberman, Richard

CONTRACT NO. AFOSR-87-0134

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-87-1589

UNCLASSIFIED REPORT

ABSTRACT: (U) The equations for the spatial and temporal modulations of the phase shift for slowly varying strongly nonlinear oscillators and dispersive waves have been determined for the first time. The effects of dissipative perturbations have been investigated for nonlinear oscillatory solutions of ordinary and partial differential equations (described by Klein-Gordon and Korteweg-de Vries type equations). The phase shift equations were derived using the method of multiple scales by evaluating the small perturbations to the exact action equation, a somewhat simpler technique than usual elimination of secular terms at an even higher order in the asymptotic expansion. It has been shown that, for dissipative perturbations, the frequency and action equations are valid to higher order and that their variations are only due to perturbations in the wave number and the averaged amplitude parameters. For second-order ordinary differential equations, the phase shift is determined from initial conditions in straight-forward manner since it was shown that there exists a new adiabatic invariant.

DESCRIPTORS: (U) *OSCILLATORS, ADIABATIC CONDITIONS,

AD-A185 630

AD-A185 630 CONTINUED

AMPLITUDE, ASYMPTOTIC SERIES, DAMPING, DIFFERENTIAL EQUATIONS, DISPERSIONS, DISSIPATION, ELIMINATION, INVARIANCE, LONG RANGE(TIME), LOW STRENGTH, MODULATION, NONLINEAR SYSTEMS, OSCILLATION, PARTIAL DIFFERENTIAL EQUATIONS, PERTURBATIONS, PHASE SHIFT, SOLUTIONS(GENERAL), VARIATIONS.

IDENTIFIERS: (U) Klein gordon equations, Kortewels de vries equations, Cnoidal waves, PE61102F, WUAFOSR2304A4.

AD-A185 630

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 626 12/9

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Automating Rule Strengths in Expert Systems.

DESCRIPTIVE NOTE: Doctoral thesis 1 Jul 83-31 Aug 86,

MAY 87 157P

PERSONAL AUTHORS: Valtorta, Marco G.

CONTRACT NO. AFOSR-83-0205, $AFOSR-81-0221

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1348

UNCLASSIFIED REPORT

ABSTRACT: (U) Automating rule strengths in expert systems is a way to alleviate the knowledge acquisition bottleneck. It is assumed that rules are fixed, except for the values of their strengths, which are computed or adjusted from initial values given by experts. A model of expert systems is proposed, in which rules have the form IF (P sub 1 & P sub 2 & . . . & P sub n) THEN C WITH ATTENUATION a, where P sub 1, P sub 2 , . . ., P sub n, and C are weighted propositions, i.e., statements with a certainty factor (CF), and a, the strength of the rule, is a number between 0 and 1. To compute rule attenuations, two problem settings are considered. In the first, an oracle is given, that can provide the CFs of the conclusions of the entire rule-based system, given any assignment of certainty factors to the premises of the entire system (complete case). In the second, a fixed set of cases is available (incomplete case). A fast algorithm for synthesis in the complete case for simple rule bases is given both for MAX and probabilistic sum. In the incomplete case, the synthesis of attenuations is shown to be NP-Complete, even for very shallow rule bases with only two propositions in the premise of each rule, both for MAX and probabilistic sum. The refinement of attenuations from expert-given estimates is shown to be NP-Hard, no matter how close to the correct value the estimates are and how small an improvement towards the correct value is desired. (Author)

AD-A185 626

AD-A185 626 CONTINUED

DESCRIPTORS: (U) , ACQUISITION, ALGORITHMS, ATTENUATION, MODELS, SHALLOW DEPTH, SYNTHESIS.

IDENTIFIERS: (U) *Expert systems, PE61102F, WUAFOSR2304A3.

AD-A185 626

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 625 20/11

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) The Paradoxical Asymptotic Status of Massless Springs,

MAR 87 34P

PERSONAL AUTHORS: Antman, Stuart S.

REPORT NO. MD87-11-SSA, TR87-11

CONTRACT NO. AFOSR-87-0073

MONITOR: AFOSR
TR-87-1380

UNCLASSIFIED REPORT

ABSTRACT: (U) The most fundamental problem in the entire theory of oscillations is to describe the motion of a mass point, the tip mass, attached to a spring. Within the classical theory of particle mechanics, the spring is regarded as massless, so that it serves only to transmit a force to the tip mass. This force typically depends on the position and velocity of the tip mass in perhaps a nonlinear way. In this case, the motion is governed by an autonomous ordinary differential equation. On the other hand, if the spring has mass, then its motion as a continuum is coupled to that of the tip mass. If the spring has a nonlinear constitutive equation, then the analysis of the resulting motion, governed by partial differential equations, can be formidable indeed. This paper studies the motion of both tip mass and spring when the mass density of the spring is small and when its constitutive equation describes nonlinearly elastic and viscoelastic materials. Although these constitutive equations do not account for past history, if its nevertheless proven that in the formal limit as the spring's mass density goes to zero the equation for the tip mass is an ordinary differential equation for elastic springs, but is generally not so for viscoelastic springs.

DESCRIPTORS: (U) *SPRINGS, *VISCOELASTICITY, DENSITY, DIFFERENTIAL EQUATIONS, ELASTIC PROPERTIES, EQUATIONS OF MOTION, EQUATIONS, MASS, MATERIALS, MECHANICS, NONLINEAR SYSTEMS, OSCILLATION, PARTIAL DIFFERENTIAL EQUATIONS, PARTICLES, THEORY.

IDENTIFIERS: (U) Hooks law, Massless spring.

AD-A185 625

AD-A185 624 20/4

HOKENSON CO LOS ANGELES CA

(U) Turbulence in Hypersonic Flow.

DESCRIPTIVE NOTE: Final rept. 15 Dec 86-14 Jun 87,

JUL 87 79P

PERSONAL AUTHORS: Hokenson, Gustave J.

REPORT NO. HOKE-THC-02GH87071A

CONTRACT NO. F49620-87-C-0012

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-87-1034

UNCLASSIFIED REPORT

ABSTRACT: (U) Numerical simulations of hypersonic shear flow, utilizing the full-time-dependent compressible flow Navier-Stokes equations, have been carried out to demonstrate the feasibility of exposing, computationally, the essential structure/physic of turbulent fluctuations in high speed flow. The geometry employed is one of interest to the U.S. Air Force in various applications, namely a right circular cylinder whose axis is aligned with the on-coming flow and around which the cylinder could be rotated. By simulating the flow along a cylinder of the infinite axial extent, an exceptionally quiet flow was established. Due to limitations of computational time, it was necessary to excite artificially this flowfield with periodic suction and blowing located well upstream of the observation plane. As a result, fluctuations in the flowfield entropy, vorticity and pressure were observed which revealed a distinct Mach number dependence. At hypersonic Mach numbers, the fluctuating entropy defined a second boundary layer edge, well beyond that of the vorticity but not propagating deep into the inviscid, flow, as was observed in both transonic and supersonic regimes.

DESCRIPTORS: (U) *HYPERSONIC FLOW, *SHEAR PROPERTIES, BOUNDARY LAYER, EDGES, ENTROPY, FLOW FIELDS, HIGH

AD-A185 624

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 624 CONTINUED

VELOCITY, HYPERSONIC VELOCITY, FLOW NOISE, NOISE REDUCTION, MACH NUMBER, NUMERICAL ANALYSIS, SUCTION, INVISCID FLOW, DIGITAL SIMULATION, TURBULENCE, TURBULENT FLOW, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

AD-A185 624

AD-A185 616 12/5

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

(U) Air Force Scientific Report for AFOSR Grant AFOSR-85-0252.

DESCRIPTIVE NOTE: Final rept. 15 Jun 85-14 Oct 86,

MAR 87 14P

PERSONAL AUTHORS: Chandy, K. M.; Misra, J.

CONTRACT NO. AFOSR-85-0252

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1577

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work has concentrated on developing a unifying framework, under the name UNITY, for studying problem-solving in parallel programming independent of specific architectural considerations. We have proposed a simple model of computation and a logic to reason about properties of such programs and have managed to study problems from a variety of problem areas. We have developed a number of transformations which are appropriate for implementations on a variety of architectures: sequential, asynchronous shared memory, distributed message passing, synchronous parallel with shared memory, systolic arrays, and VLSI chips. The diversity of the application areas and the architectures studied lends credence to our hypothesis that there is a UNITY to programming.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *PROBLEM SOLVING, AIR FORCE, ASYNCHRONOUS SYSTEMS, COMPUTATIONS, COMPUTER ARCHITECTURE, DISTRIBUTION, MEMORY DEVICES, MESSAGE PROCESSING, PARALLEL PROCESSING, SEQUENCES, TIME SHARING, TRANSFORMATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A185 616

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 611 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Peakedness of Weighted Averages of Jointly Distributed Random Variables.

DESCRIPTIVE NOTE: Technical rept.,

AUG 87 10P

PERSONAL AUTHORS: Chan, Wai; Park, Dong H.; Proschan, Frank

REPORT NO. FSU-STATISTICS-TR-M712R, TR-85-184R

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1574

UNCLASSIFIED REPORT

ABSTRACT: (U) This note extends the Proschan (1965) result on peakedness comparison for convex combinations of i.i.d. random variables from a PF sub 2 density. Now the underlying random variables are jointly distributed from a Schur-concave density. The result permits a more refined description of convergence in the Law of Large Numbers. Keywords: Cauchy distribution; Convergence.

DESCRIPTORS: (U) *RANDOM VARIABLES, *WEIGHTING FUNCTIONS, CAUCHY PROBLEM, CONVERGENCE, DISTRIBUTION, MEAN, DENSITY.

IDENTIFIERS: (U) Schur concave density, PE61102F, WUAFOSR2304A5.

AD-A185 610 12/2

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Lossless Cascade Networks: The Crossroads of Stochastic Estimation, Inverse Scattering and Filter Synthesis,

MAY 87 5P

PERSONAL AUTHORS: Lev-Ari, H.; Kailath, T.

CONTRACT NO. N00014-85-K-0612, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1124

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Symposium on *Circuits and Systems*. p1088-1091 May 87.

ABSTRACT: (U) A correspondence is established between a family of inverse scattering problems, including filter synthesis and seismic exploration, and a family of matrix factorization problems, including stochastic filtering, stability testing, partial/stochastic realization and model order reduction. This correspondence originates from the notion of energy conversation (i.e., losslessness), and it involves computational procedures whose signal-flow-graph representation is a lossless cascade network. Our analysis of recent results on , efficient triangular factorization of Hermitian matrices indicates a possible extension of the network-theoretic notion of losslessness. (Reprints)

DESCRIPTORS: (U) *COMPUTATIONS, *INVERSE SCATTERING, *NETWORKS, *STOCHASTIC PROCESSES, ENERGY, ESTIMATES, FILTERS, LOSSES, MODELS, REPRINTS, SEISMOLOGY, STABILITY, SYNTHESIS, TEST AND EVALUATION, VOICE COMMUNICATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 605 21/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Performance-Limiting Factors in MPD Thrusters.

DESCRIPTIVE NOTE: Final rept. 15 Dec 84-30 Apr 86,

APR 87 57P

PERSONAL AUTHORS: Martinez-Sanchez, Manuel

CONTRACT NO. AFOSR-83-0035

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-87-1353

UNCLASSIFIED REPORT

ABSTRACT: (U) The following results: (a) A theoretical formulation of the flow of plasma in a variable area accelerator under conditions where the voltage is dominated by the back e.m.f., showing novel features akin to those found in ordinary gas dynamics, but with the magnetoacoustic speed playing the controlling role. (b) A numerical model of an axisymmetric MPD thruster of realistic geometry with fully coupled gas and electrodynamic effects, but limited by numerical difficulties to conditions well below onset. (c) design and construction of test channels to investigate the effects predicted by the above theories, and (d) Generation of a limited computerized MPD data predicted by the above theories, and (e) Generation of a limited computerized MPD data base. Keywords: Magnetoplasmadynamic thruster; Electric propulsion.

DESCRIPTORS: (U) *THRUSTERS, *ARC JET ENGINES, COUPLING(INTERACTION), DATA BASES, ELECTRIC PROPULSION, ELECTRODYNAMICS, FORMULATIONS, GAS DYNAMICS, GASES, LIMITATIONS, MATHEMATICAL MODELS, PERFORMANCE(ENGINEERING), VARIABLES, MAGNETOHYDRODYNAMICS.

IDENTIFIERS: (U) *Magnetoplasmadynamic thrusters, PE61102F, WUAFOSR2308A1.

AD-A185 605

AD-A185 604 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Local Likelihood Method in the Problems Related to Change Points.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 4P

PERSONAL AUTHORS: Krishnaiah, P. R.; Miao, B. Q.; Zhao, L. C.

REPORT NO. TR-87-22

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0975

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the so-called local likelihood method is suggested for solving the change point problems when the data are distributed as multivariate normal. The detection procedures proposed not only provide strongly consistent estimates for the number and locations of the change points, but also simplify significantly the computation. Keywords: Edge detection; Information theory; Quality control. (Author)

DESCRIPTORS: (U) *POINTS(MATHEMATICS), *NORMAL DISTRIBUTION, CONSISTENCY, DETECTION, EDGES, ESTIMATES, INFORMATION THEORY, QUALITY CONTROL, MULTIVARIATE ANALYSIS, PROBLEM SOLVING.

IDENTIFIERS: (U) Local likelihood method, Change points, PE61102F, WUAFOSR2304A5.

AD-A185 604

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 601 20/4

VON KARMAN INST FOR FLUID DYNAMICS RHODE-SAINT-GENESE (BELGIUM)

(U) The Interaction of an Oblique Shock Wave with a Laminar Boundary Layer Revisited. An Experimental and Numerical Study.

87 19P

PERSONAL AUTHORS: Degrez, G.; Boccadoro, C. H.; Wendt, J. F.

CONTRACT NO. AFOSR-83-0273

MONITOR: AFOSR TR-87-1367

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluid Mechanics, v177 p247-263 1987.

ABSTRACT: (U) An investigation of an oblique shock wave/ laminar boundary layer interaction is presented. The Mach number was 2.15, the Reynolds number was 100,000 and the overall pressure ratio was 1.55. The interaction has been demonstrated to be laminar and nominally two dimensional. Experimental results include pressure distributions on the plate in the attached and separated regions. The numerical results have been obtained by solving the full compressible Navier-Stokes equations with the implicit approximate factorization algorithm by Beam & Warming (1980). Comparison with experimental data shows good agreement in terms of pressure distributions, positions of separation and reattachment and velocity profiles. Keywords: Supersonic flow. (Reprints)

DESCRIPTORS: (U) *LAMINAR BOUNDARY LAYER, *SHOCK WAVES, ALGORITHMS, EXPERIMENTAL DATA, MACH NUMBER, NUMERICAL ANALYSIS, PRESSURE, PRESSURE DISTRIBUTION, PROFILES, RATIONS, REPRINTS, REYNOLDS NUMBER, SUPERSONIC FLOW, VELOCITY, NAVIER STOKES EQUATIONS, TWO DIMENSIONAL.

IDENTIFIERS: (U) Oblique shock waves.

AD-A185 601

AD-A185 600 12/5 12/7

SYRACUSE UNIV NY SCHOOL OF COMPUTER AND INFORMATION SCIENCE

(U) Logic Programming and Knowledge Base Maintenance.

DESCRIPTIVE NOTE: Final rept. 1 Sep 82-30 Sep 86,

SEP 86 152P

PERSONAL AUTHORS: Bowen, Kenneth A.

CONTRACT NO. AFOSR-82-0292

PROJECT NO. 2304

TASK NO. K1

MONITOR: AFOSR TR-87-1170

UNCLASSIFIED REPORT

ABSTRACT: (U) The maintenance of large volatile knowledge bases is the focus of this project. The viewpoint from which the study is being conducted is that of certain extensions of current logic programming systems, primarily the so-called metalanguage systems in which a logic programming language is amalgamated with a portion of its metalanguage. Major thrusts of the work include (1) study of the extent to which such representation mechanisms as frames and semantic nets can be logically treated (thus yielding a measure of independence of representation for the rest of the work), and (2) the use of the metalanguage facilities for the maintenance of consistency and integrity under change and other questions of analysis of the knowledge base. Computer-based systems to aid human intelligence analysts are instances of a generic class of systems known as tracking systems. Such systems minimally consist of knowledge base in which records representing the analyst's concerns are stored. A useful organization of such knowledge bases distinguishes between events and event-lines. Events are relatively discrete in time, such as signal reports or activity reports, while event-lines are extended, continuous sequences of events. Events may be thought of as discrete points, plotted on some event-line. One maybe also impose a hierarchical structure among event-lines with individual event-lines

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 600 CONTINUED

constituting components of some higher-level event line.
Keywords: Metaprolog; Programming language.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *DATA BASES, *SYSTEMS MANAGEMENT, ANALYSTS, COMPUTER APPLICATIONS, COMPUTER PROGRAMMING, CONSISTENCY, DISCRETE DISTRIBUTION, FRAMES, HUMANS, INTELLIGENCE, LOGIC, MAINTENANCE, MILITARY FACILITIES, NETS, PROGRAMMING LANGUAGES, SEMANTICS, SIGNALS, THRUST, TRACKING, HIGH LEVEL LANGUAGES, COMPUTER LOGIC.

IDENTIFIERS: (U) Metalanguages, *Logic programming, PE61102F, WUAFOSR2304K1.

AD-A185 600

AD-A185 598 12/2

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Orbit Theorems and Sampling,

86 44P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1169

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Algebraic and Geometric Methods in Nonlinear Control Theory, p441-483 1986.

ABSTRACT: (U) This paper proposes a notion of smooth action on a manifold, and establishes a general integrability result for certain associated distributions. As corollaries, various classical and new results on manifold structures of orbits are established, and the main theorem on preservation of transitivity under sampling is shown to be a simple consequence. One of the basic results in control theory, states that, for continuous time systems, each orbit (set accessible with positive- and negative-time motions from a given starting state) has a structural of immersed submanifold of the state space. This structure is obtained, roughly, as follows. Given any piecewise constant control steering a state into the state xi this control having switches at times t sub 1, ..., t sub k, tangent vectors to the orbit at xi are obtained by taking perturbations of the t sub i. (More precisely, positive- and negative- time controlled motions are used.) When phrased in terms of the integrability of an associated distribution, this generalizes classical theorems of Frobenius and Chow.

DESCRIPTORS: (U) *CONTROL THEORY, MANIFOLDS(ENGINES), MOTION, ORBITS, PERTURBATIONS, SAMPLING, STRUCTURES, THEOREMS, TIME.

AD-A185 598

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 598 CONTINUED

IDENTIFIERS: (U) Manifolds(Mathematics), Lie algebra, PE61102F, WUAFOSR2304A1.

AD-A185 597 12/4

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF MATHEMATICS STATISTICS AND COMPUTER S CIENCE

(U) Subset Selection Toward Optimizing the Best Performance at a Second Stage,

APR 87 10P

PERSONAL AUTHORS: Ehrman, Chaim M.; Krieger, Abba; Miescke, Klaus J.

CONTRACT NO. AFOSR-85-0347

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1326

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Business and Economic Statistics, v5 n2 p295-303 Apr 87.

ABSTRACT: (U) In search for the best of n candidates, two-stage procedures of the following type are in common use. In a first stage, weak candidates are removed, and the subset of promising candidates is then further examined. At a second stage, the best of the candidates in the subset is selected. In this article, optimization is not aimed at the parameter with largest value but rather at the best performance of the selected candidates at Stage 2. Under a normal model, a new procedure based on posterior percentiles is derived using a Bayes approach, where nonsymmetric normal (proper and improper) priors are applied. Comparisons are made with two other procedures frequently used in selection decisions. The three procedures and their performances are illustrated with data from a recent recruitment process at a Midwestern university. (Keywords: Screening; Scoring; Standard; Deviation; Reprints). (Author)

DESCRIPTORS: (U) *DECISION MAKING, *SCORING, BAYES THEOREM, LOW STRENGTH, MODELS, PERSONNEL SELECTION, OPTIMIZATION, RECRUITING, REPRINTS, SELECTION, STAGING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 598

AD-A185 597

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 595 12/5

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF COMPUTER SCIENCE

(U) Flexible Parsing.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 82-30 Jun 86,

JUN 86 62P

PERSONAL AUTHORS: Hayes, Philip J.

CONTRACT NO. AFOSR-82-0219

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1187

UNCLASSIFIED REPORT

ABSTRACT: (U) When people use language spontaneously they often do not adhere strictly to commonly accepte standards of grammaticality. The primary objective of this project is to develop flexible computer parsing techniques which can deal with the various kinds of ungrammaticalities that arise, both on the lexical and the phrase level. The progress towards this goal covered by this report includes: 1) The initial development of the FlexP flexible parser based on pattern-matching techniques; 2) Review of the initial design choices for FlexP in the light of this evaluation, leading to the formulation of the construction-specific approach tp parsing, and its preliminary evaluation for applied natural language processing through tne experimental parsers CASPAR and DYPAR; 3) Application of the construction-specific approach to flexible parsing to the parsing of an artificial command language in the parser for the Cousin command interface, a graceful interface for the Unix operating system; 4) Investigation of control structures that would allow the integration of multiple diverse parsing strategies into a single parsing system in an extensible manner; 5) Development of a taxonomy of grammatical deviations and recovery strategies for dealing with them; 6) Design and implementation of an initial version of MULTIPAR, the

AD-A185 595 CONTINUED

large-scale robust restricted-domain parser mentioned above that employs multiple construction-specific parsing strategies; and 7) Application of the flexible parsing techniques developed under previous parts of the contract to speech input.

DESCRIPTORS: (U) *PARSERS, CONTROL, GRAMMARS, INPUT, INTERFACES, MATCHING, METHODOLOGY, NATURAL LANGUAGE, PATTERNS, PROCESSING, RECOVERY, SPEECH, STRATEGY, STRUCTURES, TAXONOMY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 592 12/3

FORD AEROSPACE AND COMMUNICATIONS CORP PALO ALTO CA

(U) Diffusion First Passage Times: Approximations and Related Differential Equations,

86 27P

PERSONAL AUTHORS: Wenocur, Michael L.

CONTRACT NO. F49620-86-C-002., DAAG29-82-K-0151

MONITOR: AFOSR TR-87-1370

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper is primarily concerned with computing first passage time statistics. In previous work a general reliability model was proposed in which system failures occur when either system wear-and-tear reaches some maximum permissible level (ie, a first passage occurs), or when some killing event happens (such killing events occur with rate k(x) in state x). Under this model w(x,t) satisfies a certain equation: It is possible to solve for w(x,t) and related quantities with methods very similar to those presented here. In Section 2, algorithms for approximating w(x,t) are obtained. In particular, the infinite spectral expansion for w(x,t) is approximated by an n-term sub-expansion which matches the first n-1 moments. Section 2 concludes with some remarks about out preliminary computational experience. In Sections 3 and 4, methods are given for obtaining the eigenvalues and first passage moments, necessary for computing approximations to w(x,t). In Section 5, computational issues related to calculating the moment generating function are considered. Section 6 and 7 include theoretical complements about first passage times. In particular, the moment generating function is shown to possess an interesting representation having exponential form. This exponential representation is related to asymptotic expansions used in analyzing perturbations of certain second-order differential equations.

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, *TIME STUDIES, ALGORITHMS, ASYMPTOTIC SERIES, DIFFERENTIAL EQUATIONS, EIGENVALUES, EXPANSION, MOMENTS, RELIABILITY, SPECTRA, STATISTICS, TIME, MATHEMATICAL MODELS, APPROXIMATION(MATHEMATICS), BROWNIAN MOTION, COMPUTATIONS.

AD-A185 592

AD-A185 591 12/3

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

(U) Bivariate Exponential and Geometric Autoregressive and Autoregressive Moving Average Models.

DESCRIPTIVE NOTE: Technical rept.,

MAR 86 32P

PERSONAL AUTHORS: Block, H. W.; Langberg, N. A.; Stoffer, D. S.

REPORT NO. TR-86-01

CONTRACT NO. AFOSR-84-0113

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-87-1050

UNCLASSIFIED REPORT

ABSTRACT: (U) This document presents autoregressive (AR) and autoregressive moving average (ARMA) processes with bivariate exponential (BE) and bivariate geometric (BG) distributions. The theory of positive dependence is used to show that in various cases, the BEAR, BGAR, BEARMA, and BGARMA models consist of associated random variables. The authors discuss special cases of the BEAR and BGAR processes in which the bivariates processes are stationary and have well known bivariate exponential and geometric distributions. (Author)

DESCRIPTORS: (U) *BIVARIATE ANALYSIS, *REGRESSION ANALYSIS, *MATHEMATICAL MODELS, EXPONENTIAL FUNCTIONS, GEOMETRY, RANDOM VARIABLES, STATISTICAL DISTRIBUTIONS, THEORY, STATIONARY.

IDENTIFIERS: (U) *Autoregressive analysis, PE61102F, WUAFOSR2304K3.

AD-A185 591

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 590 19/9

COLORADO UNIV AT BOULDER DEPT OF CIVIL ENVIRONMENTAL AND ARCHITECTURAL ENGINEE RING

(U) Centrifugal and Numerical Modeling of Buried Structures. Volume 1. Executive Summary.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-28 Feb 87,

JUL 87 52P

PERSONAL AUTHORS: Ko, Hon-Yim

CONTRACT NO. AFOSR-84-0300

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-87-1352

UNCLASSIFIED REPORT

ABSTRACT: (U) This volume is an executive summary of the research project on centrifugal and numerical modeling of buried structures subjected to static and dynamic loadings on the ground surface. Techniques were developed for testing model buried pipes in a geotechnical centrifuge. An impact generator was developed for applying an airblast loading on the centrifuge model. A dynamic stress gage was developed for measuring the stresses generated in the soil and acting on the buried pipe during the airblast loading. Finite element analyses were performed on the buried pipe experiments. Comparison between centrifuge test data and analytical results is used to validate the numerical analysis procedure. Keywords: Soil-structure interaction; Centrifuge model testing; Static loading.

DESCRIPTORS: (U) *BLAST LOADS, *BURIED OBJECTS, *PIPES, *UNDERGROUND STRUCTURES, CENTRIFUGAL FIELDS, CENTRIFUGES, DYNAMICS, EXPERIMENTAL DATA, FINITE ELEMENT ANALYSIS, GAGES, GENERATORS, GROUND LEVEL, IMPACT, INTERACTIONS, MATHEMATICAL MODELS, MODEL TESTS, MODELS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, SOILS, STATIC LOADS, STRESSES, STRUCTURES, SURFACES, DYNAMIC LOADS, AIRBORNE.

AD-A185 590 CONTINUED

IDENTIFIERS: (U) Soil structue interaction, PE61102F, WUAFOSR2302C1.

AD-A185 590

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 589 12/6 12/5

PURDUE UNIV LAFAYETTE IN DEPT OF COMPUTER SCIENCES

(U) Parallel PDE Algorithms and Supercomputer Architecture.

DESCRIPTIVE NOTE: Annual rept.,

85 3P

PERSONAL AUTHORS: Rice, John R.

CONTRACT NO. AFOSR-84-0385

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1192

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers activities of John R. Rice (PI) and associates since October 1984. The activity of Kai Hwang is reported separately because it is being proposed that this grant be separated into two parts due to Kai Hwang's change of position to the University of Southern California. The activities include (1) The completion and submission for publication of one technical paper on expert systems for partial differential equations, (2) The completion of one report on high level parallel languages for multiprocessors, (3) One manuscript to be presented at a conference in October 1985, (4) Three manuscripts in progress on the use of supercomputers, the use of distributed multiprocessor systems for PDEs and new numerical methods, (5) Considerable process in the analysis and high level restructuring of several important PDE algorithms for parallel execution. Independently of this grant, the investigators have just obtained a multiprocessor machine (the FLEX 32) which will greatly enhance the research program. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *SUPERCOMPUTERS, DISTRIBUTION, DOCUMENTS, HIGH LEVEL LANGUAGES, MULTIPROCESSORS, NUMERICAL METHODS AND PROCEDURES, PARALLEL ORIENTATION, PARTIAL DIFFERENTIAL EQUATIONS, POSITION(LOCATION), UNIVERSITIES, COMPUTER ARCHITECTURE, DISTRIBUTED DATA PROCESSING.

AD-A185 589

AD-A185 589 CONTINUED

IDENTIFIERS: (U) Expert systems, PE61102F, WUAFOSR2304A3.

AD-A185 589

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 587 12/3 13/8

STANFORD UNIV CA

(U) Testing Exponentiality Versus a Trend Change in Mean Residual Life.

86 12P

PERSONAL AUTHORS: Guess, Frank; Hollander, Myles; Proschan, Frank

CONTRACT NO. AFOSR-85-0007

MONITOR: AFOSR TR-87-1368

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annals of Statistics, v14 n4 p1388-1398 1986.

ABSTRACT: (U) Given that an item is of age t, the expected value of the random remaining life is called the mean residual life (MRL) at age t. We propose two new nonparametric classes of life distributions consists of those with 'increasing initially, then decreasing mean residual life' (IDMRL). The IDMRL class models aging that is initially beneficial, then adverse. The second class, decreasing, then increasing mean residual life (IDMRL), models aging that is initially adverse, then beneficial. We propose two testing procedures for H sub 0: constant MRL (i,e., exponentially) versus H sub 1: IDMRL, but not constant MRL (or H sub 1: DIMRL, but not constant MRL). The first testing procedure assumes the turning point, tau, from IDMRL to MRL is specified by the user or is known. The second procedure assumes knowledge of the proportion, rho, of the population that dies at or before the turning point (knowledge of tau itself is not assumed).

DESCRIPTORS: (U) *LIFE EXPECTANCY(SERVICE LIFE), AGING(MATERIALS), DIES, MODELS, PATTERNS, POPULATION, TEST AND EVALUATION, DISTRIBUTION FUNCTIONS, RESIDUALS, REPRINTS.

IDENTIFIERS: (U) Residual life, MRL(Mean Residual Life).

AD-A185 587

AD-A185 586 14/2 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL

(U) The Effect of Ignoring Small Measurement Errors in Precision Instrument Calibration.

DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86,

JUL 86 5P

PERSONAL AUTHORS: Carroll, Raymond J.; Spiegelman, Clifford H.

CONTRACT NO. F49620-82-C-0009, N00014-83-K-0005

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1362

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Quality Technology, v18 n3 p170-173 Jul 86.

ABSTRACT: (U) This paper discusses the effect of measurement errors in both variables when using the simple linear regression model. It is often stated that if the measurement error in x is small, then we can ignore this error and fit the model to data using ordinary least squares. There is some ambiguity in the statistical literature concerning the exact meaning of a small error. For example, Fraper and Smith (1981) state that if the measurement error variance in x is small relative to the variability of the true x's, then 'errors in the x's can be effectively ignored'. See Montgomery and Peck (1983) for a similar statement. Scheffe (1973) and Mandel (1984) argue for a second criterion, which may be informally summarized that the error in x should be small relative to (the standard deviation of the observed Y about the line)/(slope of the line). We argue that for calibration experiments, both criteria are useful and important; the former for estimation of x given Y, and the latter for the lengths of confidence intervals for x given Y.

DESCRIPTORS: (U) *CALIBRATION, *LINEAR REGRESSION

AD-A185 586

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 586 CONTINUED

ANALYSIS, *TEST METHODS, CONFIDENCE LIMITS, ERRORS, INSTRUMENTATION, LEAST SQUARES METHOD, MATHEMATICAL MODELS, MEASUREMENT, PRECISION, STANDARD DEVIATION, VARIATIONS, TEST EQUIPMENT, REPRINTS, ERROR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, WUNR042544.

AD-A185 584 12/4

COLUMBIA UNIV NEW YORK DEPT OF STATISTICS

(U) Dynamic Repair Allocation for a K Out of N System Maintained by Distinguishable Repairmen.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-30 Sep 87,

AUG 87 17P

PERSONAL AUTHORS: Katehakis, Michael N.; Melolidakis, Costis

CONTRACT NO. AFOSR-87-0072

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1039

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors consider a K out of N system maintained by R repairmen, where the lifetime of the i sub th component is an exponentially distributed random variable with parameter micron sub i. Repairmen are distinguishable, and the time it takes the r sub th repairmen to repair a failed component is an exponentially distributed random variable with parameter lambda sub k. Repaired components are as good as new and preemptions are allowed. It is shown that the policy which assigns the faster repairmen to the most reliable components is optimal with respect to several optimality criteria. The approach taken in establishing stochastic optimality with respect to the number of functioning components is of wide applicability to different classes of stochastic optimization problems. (Author)

DESCRIPTORS: (U) *REPAIR, *LIFE EXPECTANCY(SERVICE LIFE), *STATISTICAL ANALYSIS, ALLOCATIONS, OPTIMIZATION, RELIABILITY, STOCHASTIC PROCESSES, RANDOM VARIABLES, FAILURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 586

AD-A185 584

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 583 6/5 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Event-Based Estimation of Interacting Markov Chains with Applications to Electrocardiogram Analysis,

SEP 86 38P

PERSONAL AUTHORS: Doerschuk, Peter C.; Tenney, Robert R.; Willsky, Alan S.

REPORT NO. LIDS-P-1611

CONTRACT NO. AFOSR-82-0258

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1051

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper examines the problem of estimating the state of a distributed finite-state Markov process consisting of several interacting finite-state systems each of whose transition probabilities are influenced by the states of the other processes. The observations on which the estimation procedure is based are continuous signals containing signatures indicative of the occurrence of particular events in the various finite-state systems. The problem of electrocardiogram analysis serves both as the primary motivation for this investigation and as the source of a case study we describe in the paper. The principal focus of the paper is on the development of an approach that overcomes the combinatorial explosion of truly optimal estimation algorithms. The authors accomplish this by constructing a systematic design methodology in which the resulting estimator consists of several interacting estimators, each focusing on a particular subprocess. Important questions addressed concern the way in which these estimators interact and the method each estimator uses to account in its own model for the influence of other subprocesses.

DESCRIPTORS: (U) *ELECTROCARDIOGRAPHY, *ALGORITHMS,

AD-A185 583

AD-A185 583 CONTINUED

*MATHEMATICAL MODELS, ALGORITHMS, COMBINATORIAL ANALYSIS, ESTIMATES, EXPLOSIONS, INTERACTIONS, MARKOV PROCESSES, METHODOLOGY, MOTIVATION, OPTIMIZATION, PROBABILITY, SIGNALS, TRANSITIONS, SIGNAL PROCESSING, WAVEFORMS.

IDENTIFIERS: (U) Markov chains. PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 582 7/5

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Movies and 3-D Images of Flowfields Using Planar Laser-Induced Fluorescence.

JUL 87 5P

PERSONAL AUTHORS: Kychakoff, George; Paul, Phillip H.; Van Cruyningen, Ike; Hanson, Ronald K.

CONTRACT NO. AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-0990

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Optics, v26 n13 p2498-2500, 1 Jul 87. Original contains color plates: All DTIC and NTIS reprductions will be in black

ABSTRACT: (U) Two-dimensional and three-dimensional flowfield imaging based on laser induced fluorescence is described. Results are reported for excimer laser excitation of OH in flames, oxygen in flames, and biacetyl seeded nitrogen flows at room temperature. Methods for extending the repetition rate and increasing the spatial resolution (number of pixels) of solid state imaging are discussed. (Reprints).

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, EXCIMERS, EXCITATION, FLAMES, FLOW FIELDS, FLOW VISUALIZATION, IMAGE TUBES, IMAGES, LASERS, OXYGEN, PLANAR STRUCTURES, REPETITION RATE, REPRINTS, RESOLUTION, ROOM TEMPERATURE, SOLID STATE ELECTRONICS, SPATIAL DISTRIBUTION, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A185 582

AD-A185 581 12/9

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Detection of Change Points Using Mean Vectors.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86 30P

PERSONAL AUTHORS: Krishnaiah, P. R.; Miao, B. Q.; Zhao, L. C.

REPORT NO. TR-86-41

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1020

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors consider the problem of change points within the framework of model selection procedures using information theoretic criteria. The authors proposed procedures for estimation of the locations of change points and the number of change points. The strong consistency of these procedures is also established. Also, the problem of change points is discussed within the framework of the simultaneous test procedures. Keywords: Edge detecting; Quality control; Normal distribution; Multivariate analysis. (Author)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, INFORMATION THEORY, MODELS, NORMAL DISTRIBUTION, QUALITY CONTROL, SELECTION, SYNCHRONISM, TEST METHODS, PATTERN RECOGNITION.

IDENTIFIERS: (U) *Edge detection, PE61102F, WUAFOSR2304H5.

AD-A185 581

AD-A185 580 12/3

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Convergent Iterations for Computing Stationary Distributions of Markov Chains,

JUL 86 10P

PERSONAL AUTHORS: Barker, G. P.; Plemmons, Robert J.

CONTRACT NO. AFOSR-83-0255

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1325

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Algebraic and Discrete Methods, v7 n3 p390-398 Jul 86.

ABSTRACT: (U) Classical iterative schemes such as the Gauss-Seidel method and its variations constitute powerful tools for computing stationary distribution vectors for large-scale Markov process, such as those arising in queueing network analysis. The coefficient matrix A in these processes in a Q-matrix, i.e., a singular irreducible M-matrix with zero column sums and, unlike the nonsingular case, the classical iterations for A do not always converge. The purpose of this paper is to survey the recent literature and to analyze the behavior ot these methods completely in terms of the graph structure of A. The results given here hold under somewhat weaker assumptions on A. Keywords: Markov chains, Queueing networks, Stochastic processes. (Author)

DESCRIPTORS: (U) *ITERATIONS, *MARKOV PROCESSES, *QUEUEING THEORY, CONVERGENCE, DISTRIBUTION, GRAPHS, NETWORK ANALYSIS(MANAGEMENT), NETWORKS, STATIONARY, STOCHASTIC PROCESSES, REPRINTS.

IDENTIFIERS: (U) Markov chains, Gauss seidel method, PE61102F, WUAFOSR2304A3.

AD-A185 572 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Relations between Increasing Functions Associated with Two-Parameter Continuous Martingales,

JUN 87 28P

PERSONAL AUTHORS: Nualart, D.; Sanz, M.; Zakai, M.

REPORT NO. TR-190

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1103

UNCLASSIFIED REPORT

ABSTRACT: (U) Let M be a two-parameter continuous martingale bounded in L squared and null on the axes. The positive submartingale M squared has has a Doob-Meyer decomposition. The purpose of this paper is to relate the measures induced by certain quadratic variations in terms of the absolute continuity property. Since we are dealing with random measures, different definitions are possible. Keywords: Convergence; Theorems; One dimensional; Stochastic processes.

DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, CONTINUITY, STOCHASTIC PROCESSES, VARIATIONS, CONVERGENCE, ONE DIMENSIONAL.

IDENTIFIERS: (U) *Martingales, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 571 12/5

SYRACUSE UNIV NY SCHOOL OF COMPUTER AND INFORMATION SCIENCE

(U) Logic Programming and Knowledge Maintenance.

DESCRIPTIVE NOTE: Final rept. 30 Oct 84-30 Nov 86,

AUG 87 153P

PERSONAL AUTHORS: Bowen, Kenneth A.

CONTRACT NO. AFOSR-82-0292

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-87-1304

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this work was to study large volatile knowledge bases. The research involved developing extensions to logic programming systems in the form of a metalanguage, by studying to what extent frames and semantic nets could be employed. The management of consistency and integrity under change using a metalanguage was analyzed. This research produced a rule-based deductive programming language, called metaProglog, which enhances Prolog's ability to manipulate the databases themselves and to reason about them. This was accomplished by regarding databases (or theories) as first-class objects capable of being passed as arguments. Four papers were published under this grant, including Meta-kavek programming and knowledge representation and metaProlog: A metalevel extension to Prolog. (Author)

DESCRIPTORS: (U) *HIGH LEVEL LANGUAGES, ADAPTERS, COMPUTER PROGRAMMING, CONSISTENCY, DATA BASES, FRAMES, LOGIC, MANAGEMENT, NETS, SEMANTICS, COMPUTER LOGIC.

IDENTIFIERS: (U) *Logic programming, Metaprolog programming language, PE61103F, WUAFOSR2304A7.

AD-A185 571

AD-A185 568 20/4

MICHIGAN STATE UNIV EAST LANSING TURBULENCE STRUCTURE LAB

(U) The Production of Turbulence in Boundary Layers -- The Role of Microscale Coherent Motions.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 86,

JUN 87 105P

PERSONAL AUTHORS: Falco, R. E.

REPORT NO. TSL-87-3

CONTRACT NO. F49620-85-C-0002

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1194

UNCLASSIFIED REPORT

ABSTRACT: (U) Details of the turbulence production process in turbulent boundary layers in the wall region have been clarified, especially the formation of the long streaky structure, and secondary hairpin vorticity. It appears that the outer region microscale coherent motion called a Typical eddy plays the dominant role in the process. Long time averaged statistics of the two point vorticity-vorticity correlations support the conditionally sampled data and interpretations. The typical eddy produces the long streaks along with the pockets, and one of the hairpins directly. Several other hairpins form from the evolution of the vorticity produced by the passage of the typical eddy over the wall. A model of the typical eddy/wall region interaction, i.e., a vortex ring/Stokes layer interaction, was investigated to see if it could reproduce all of the morphology. It was found that the model can produce all of the turbulent boundary layer features associated with production, including the long streaks. By using the model, we have gained new insights into the sensitivity of the production process. Relatively small differences in the convection velocity of the excitation eddies have been found to result in the difference between turbulent

AD-A185 568

AD-A185 568 CONTINUED

boundary layer production and spot production (which involves very strong lateral production). Our data suggest that there are many combinations of parameters that can result in critical conditions.

DESCRIPTORS: (U) *EDDIES(FLUID MECHANICS), *TURBULENCE, *TURBULENT BOUNDARY LAYER, BOUNDARY LAYER, COHERENCE, CONVECTION, EVOLUTION(GENERAL), EXCITATION, INTERACTIONS, LONG RANGE(TIME), MOTION, PRODUCTION, SAMPLING, VELOCITY, WALLS, VORTICES, RINGS.

IDENTIFIERS: (U) Vorticity, Vortex rings, WUAFOSR2307A2, PE61102F.

AD-A185 568

AD-A185 562 12/5

CORNELL UNIV ITHACA NY DEPT OF THEORETICAL AND APPLIED MECHANICS

(U) Development of Symbolic Computation Methods for Nonlinear Dynamics.

DESCRIPTIVE NOTE: Final rept. 30 Jul 84-29 Dec 85,

JUL 87 8P

PERSONAL AUTHORS: Rand, R. H.

CONTRACT NO. AFOSR-84-0311

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1344

UNCLASSIFIED REPORT

ABSTRACT: (U) Under the supervision of principal investigator R.H. Rand, software has been written in MACSYMA which automatically performs normal form computations for systems of nonlinear nonautonomous differential equations. We have produced a package which permits the user to perform Taylor expanded near identity transformations with unevaluated coefficients on a system of autonomous ODE's (valid to terms of arbitrary order), and then to choose the transformation coefficients so that the resulting system is in normal form. This work has been applied to the nonlinear parametric stiffness control of flexible systems by Professors Moon and Rand, and to the dynamics of coupled van der Pol oscillators.

DESCRIPTORS: (U) *COMPUTATIONS, *COMPUTER PROGRAMMING, COEFFICIENTS, COMPUTER PROGRAMS, CONTROL, DYNAMICS, NUMERICAL METHODS AND PROCEDURES, OSCILLATORS, PARAMETRIC ANALYSIS, STIFFNESS, SYMBOLS, NONLINEAR DIFFERENTIAL EQUATIONS, TRANSFORMATIONS(MATHEMATICS).

IDENTIFIERS: (U) MACSYMA programming language, PE61103F, WUAFOSR2304A5.

AD-A185 562

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 544 12/3

AD-A185 544 CONTINUED

INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

WUAFOSR2304A2.

(U) Probabilistic Performance of a Heuristic for the Satisfiability Problem.

DESCRIPTIVE NOTE: Technical rept. 30 Sep 84-May 86,

MAY 86

PERSONAL AUTHORS: Franco, John; Ho, Yuan C.

REPORT NO. TR-193

CONTRACT NO. AFOSR-84-0372

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-87-1345

UNCLASSIFIED REPORT

ABSTRACT: (U) An algorithm for the Satisfiability problem is presented and its probabilistic behavior is analysed when combined with two other algorithms studied earlier. The analysis is based on an instance distribution which is parameterized to simulate a variety of sample characteristics. The algorithm dynamically assigns values to literals appearing in a given instance until a satisfying assignment is found or the algorithm gives up without determining whether or not a solution exists. It is shown that if n clauses are constructed independently from r boolean variables where the probability that a variable appears in a clause as a positive literal is p and as a negative literal is p then almost all randomly generated instances of satisfiability are solved in polynomial time under certain conditions. Thus the combined algorithm is very effective in the probabilistic sense on instances of SAT that have solutions.

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, ALGORITHMS, BEHAVIOR, BOOLEAN ALGEBRA, HEURISTIC METHODS, POLYNOMIALS, PROBABILITY, TIME, VARIABLES, POLYNOMIALS.

IDENTIFIERS: (U) Satisfiability problem, PE61102F,

AD-A185 544

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 534 17/9 20/14 4/1

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) Observations of Very High Latitude Ionospheric Irregularities with the Goose Bay HF Radar,

JUN 85

PERSONAL AUTHORS: Greenwald, R. A.; Baker, K. B.

CONTRACT NO. AFOSR-ISSA-86-0028

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-87-1307

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Conference Proceedings on Propagation Effects on Military Systems in the High Latitude Region, p4.5-1 - 4.5.17, 3-7 Jun 85, rept. no. AGARD-CP-382.

ABSTRACT: (U) The Goose Bay HF radar is a sophisticated instrument capable of providing detailed information on very high latitude E and F region ionospheric electron density irregularities which act as a source of clutter on OTH radar systems. Through the use of two parallel phased array antennas, this instrument is able to image the location of these irregularities within a three-dimensional volume covering much of northeastern Canada and Greenland. It is also capable of following the temporal variability of these irregularities as well as determining unambiguously the Doppler shift and broadening of radar signals scattered by them. This paper presents initial results with a single phased array antenna which represent typical examples of the spatial intensity distribution of these irregularities at different local times. Examples are presented of Doppler spectra of the irregularities at different local times. Data of this type are of appreciable value in ascertaining the techniques that must be utilized to improve clutter mitigation on high latitude radar systems. (Reprints).

DESCRIPTORS: (U) *IONOSPHERIC PROPAGATION, *OVER THE HORIZON RADAR, ANTENNA ARRAYS, CANADA, CLUTTER, DOPPLER EFFECT, GREENLAND, HIGH LATITUDES, INTENSITY, PHASED ARRAYS, RADAR EQUIPMENT, RADAR SIGNALS, REPRINTS, SOURCES, SPATIAL DISTRIBUTION, SPECTRA, THREE DIMENSIONAL, VOLUME, E REGION, F REGION, ELECTRON DENSITY, RADAR INTERFERENCE.

IDENTIFIERS: (U) WUAFOSR2310A2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 532 7/4 20/5

COLORADO UNIV AT BOULDER DEPT OF CHEMISTRY

(U) Orbital Alignment Effects in the Ca(4s5p 1P1) to Ca(4s5P 3Pj) Electronic Energy Transfer with Molecular Collision Partners.

87 8P

PERSONAL AUTHORS: Bussert, Wolfgang; Leone, Stephen R.

CONTRACT NO. AFOSR-84-0272

PROJECT NO. 2301

TASK NO. K1

MONITOR: AFOSR
TR-87-1357

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v138 n2/3 p269-275, 17 Jul 87.

ABSTRACT: (U) The effects of orbital alignment on the calcium(4s5p 1p1) to calcium,(4s5p 3PJ) electronic energy transfer process are determined for molecular collision partners, Hydrogen, Deuterium, Nitrogen, Oxygen, Carbon Monoxide, Carbon Dioxide, Methane, Ethene, and Sulfur hexafluoride. Most of the molecules exhibit negligible effects, except for H2(D2) and CO2, which show significant preferences for perpendicular and parallel initial orbital alignments, respectively. In the reverse transfer direction, hydrogen exhibits an even larger effect favoring the perpendicular laser polarization. Keywords: Laser molecules.

DESCRIPTORS: (U) *ELECTRON ENERGY, *ENERGY TRANSFER, *CALCIUM, *MOLECULAR ORBITALS, ALIGNMENT, CARBON DIOXIDE, CARBON MONOXIDE, COLLISIONS, DEUTERIUM, HYDROGEN, LASERS, METHANE, MOLECULAR PROPERTIES, MOLECULES, NITROGEN, ORBITS, OXYGEN, POLARIZATION, REVERSIBLE, RIGHT ANGLES, SULFUR, TRANSFER, PARTICLE COLLISIONS, RARE GASES, ELECTRON NUCLEAR CROSS SECTIONS, MOLECULAR STRUCTURE, ATOMS, EXCITATION, LASER BEAMS.

IDENTIFIERS: (U) WUAFOSR2301K1, PE61102E.

AD-A185 532

AD-A185 531 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF MATHEMATICS

(U) The Numerical and Analytic Analysis of Implicit Differential Equations and Their Application to Control and Circuit Problems.

DESCRIPTIVE NOTE: Final rept. 16 Jul 84-15 Jan 87,

JAN 87 15P

PERSONAL AUTHORS: Campbell, Stephen L.

CONTRACT NO. AFOSR-84-0240

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1334

UNCLASSIFIED REPORT

ABSTRACT: (U) Results on the numerical and analytic solution of implicit systems of differential equations and their application to circuit and control problems were developed. In particular, the first general algorithm for the linear time varying case was developed along with an analysis of how to apply it to certain control problems. New structure theorems provide insight on the convergence of backward formulas and guidelines for their use.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *NUMERICAL ANALYSIS, ALGORITHMS, CIRCUITS, CONTROL, SOLUTIONS(GENERAL), THEOREMS, TIME, APPLIED MATHEMATICS, PROBLEM SOLVING, LINEARITY.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

AD-A185 531

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 528 12/3 9/1

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) HOC Spectral Analysis of an Almost Periodic Random Sequence in Noise,

MAY 87 35P

PERSONAL AUTHORS: He, Shuyuan; Kedem, Benjamin

REPORT NO. MD87-24-BK/SH, TR87-24

CONTRACT NO. N00014-86-K-0007, $AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1138

UNCLASSIFIED REPORT

ABSTRACT: (U) Under some conditions, the expected numbers of zero-crossings observed in a finite section of a process with a mixed spectrum and in finite sections of its filtered versions, determine the frequencies in the discrete spectrum regardless of the magnitude of the noise component. Keywords: Spectrum analysis, Oscillation; Amplitude; Higher order crossings; Stationary; Probability density functions. (Author)

DESCRIPTORS: (U) *CROSSINGS, *MIXING, *MATHEMATICAL FILTERS, NOISE, OSCILLATION, PROBABILITY DENSITY FUNCTIONS, SEQUENCES, SPECTRA, SPECTRUM ANALYSIS, RANDOM VARIABLES, WHITE NOISE, STATIONARY, SIGNAL TO NOISE RATIO.

IDENTIFIERS: (U) Zero crossings, High order crossings, WUAFOSR2304A5, PE61102F.

AD-A185 527 12/9

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Asymptotic Property on the EVLP Estimation for Superimposed Exponential Signals in Noise.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 33P

PERSONAL AUTHORS: Bai, Z. D.; Chen, X. R.; Krishnaiah, P. R.; Zhao, L. C.

REPORT NO. TR-87-19

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0977

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper studies a model of superimposed exponential signals in noise where lambda sub 1 ..... lambda sub 9 are unknown complex parameters with module 1, lambda sub qtt .... lambda sub p are unknown complex parameters with module less than 1, lambda sub 1 .... lambda sub p are assumed distinct, p assumed known and q unknown. Keywords: Random noise; Variables; Signal processing.

DESCRIPTORS: (U) *INFORMATION THEORY, NOISE.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 526 22/2 20/11

RENSSELAER POLYTECHNIC INST TROY NY

(U) Studies of the Structural Dynamic Behavior of Satellite Antenna System.

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-29 Jun 87,

JUN 87 28P

PERSONAL AUTHORS: Loewy, Robert G.

CONTRACT NO. AFOSR-83-0348

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-87-1167

UNCLASSIFIED REPORT

ABSTRACT: (U) A Transfer Matrix (TM) Analysis is formulated to predict the natural modes and frequencies of hoop-maypole type satellite antenna systems. Two directions of bending, axial extension/compression and torsion are represented as coupled by feed assemblies canted with respect to the mast, solar panels tilted out of the plane of the center structure and masses offset from the mast centerline. Shear deflections, large steady cable loads and large compressive loads are accounted for in appropriate members. Using properties chosen as representative of such structures, trends are predicted with variations in size and configuration for several simplified configurations; these include, (a) two-dimensional cable-suspended rigid bars on a flexible center body (mast), (b) T and H -shaped center body sub structures in two and three-dimensional vibrations and (c) cable-stiffened, planar polygonal hoop assemblies. IN the last of these cyclic symmetry had to be invoked to avoid numerical difficulties. Some general conclusions are drawn regarding the free vibrations of such structures. The TM approach is seen as a viable alternative to FEM analyses, when structures are encountered which have major substructures with one dimension longer than its others. Full use of the TM analysis for hoop-maypole type structures must await a reformulation in which cyclic symmetry can be invoked, as in the plane hoop cases.

AD-A185 526

AD-A185 526 CONTINUED

DESCRIPTORS: (U) *SATELLITE ANTENNAS, *VIBRATION, BENDING, COMPRESSION, COUPLING(INTERACTION), CYCLES, DEFLECTION, DYNAMICS, FLEXIBLE STRUCTURES, SHEAR PROPERTIES, SIMPLIFICATION, STRUCTURAL PROPERTIES, SYMMETRY, THREE DIMENSIONAL, TORSION, COMPUTERIZED SIMULATION, STRUCTURAL MEMBERS, ANTENNA MASTS, ANTENNA FEEDS, STRUCTURAL RESPONSE, RESONANT FREQUENCY, TWO DIMENSIONAL, MATHEMATICAL PREDICTION, DIRECTIONAL.

IDENTIFIERS: (U) Hoop maypole antennas, Transfer matrix analysis, Structural dynamics, WUAFOSR2302B1, PE61102F.

AD-A185 526

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 525 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Testing and Interval Estimation in a Change-Point Model Allowing at Most One Change.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 29P

PERSONAL AUTHORS: Chen, Xiru

REPORT NO. TR-87-25

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-0972

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers the simplest model of change-point in which at most one change in the mean may occur. Results include: 1) Introduction of a test for the null hypothesis that no change in the mean occurs, and the limit distribution of the test-statistic; 2) Approximate calculation of the power of the test; 3) Interval estimation of the position of change; 4) Point estimation of the jump at the point of change and its asymptotic distribution; and 5) Evaluation of the bias of the MLE of error variance. Keywords: Brownian motion process. (Author)

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, *STATISTICAL TESTS, *MATHEMATICAL MODELS, ASYMPTOTIC SERIES, BROWNIAN MOTION, COMPUTATIONS, ERRORS, ESTIMATES, HYPOTHESES, INTERVALS, BIAS, MEAN, STATISTICAL INFERENCE, CONFIDENCE LIMITS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 524 6/1 6/2 6/5

RUTGERS - THE STATE UNIV PISCATAWAY NJ DEPT OF PHARMACOLOGY AND TOXICOLOGY

(U) Molecular Theories of Cell Life and Death.

DESCRIPTIVE NOTE: Final rept. 15 Mar 86-11 Mar 87,

JUL 87 55P

PERSONAL AUTHORS: Ji, Sungchul

CONTRACT NO. AFOSR-86-0138

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-87-1186

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper is a brief overview of the topics discussed at this first symposia on cell life and death. Keywords: Cells(Biology), Toxicology, Membranes(Biology), Mathematical models, Biochemistry, Pathology, Physics, Chemistry.

DESCRIPTORS: (U) *CELLS(BIOLOGY), *LIFE CYCLES, BIOCHEMISTRY, BIOLOGY, CHEMISTRY, DEATH, MATHEMATICAL MODELS, MOLECULES, PATHOLOGY, PHYSICS, SYMPOSIA, THEORY, TOXICOLOGY, MOLECULE MOLECULE INTERACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 520 20/12

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF MATERIALS SCIENCE

(U) Some Investigations of Molecular Beam Epitaxial Growth of III-V Semiconductor Films via Monte-Carlo Computer Simulations, Carrier Tunnelling and Spectroscopic Ellipsometry.

DESCRIPTIVE NOTE: Final status rept 15 Apr 83-14 May 86,

AUG 87 28P

PERSONAL AUTHORS. Madhukar, A.

CONTRACT NO. F49620-83-C-0074

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-87-1331

UNCLASSIFIED REPORT

ABSTRACT: (U) From time of the inception of this work, it became clear at a relatively early stage that the USC MBE facility required major effort and investment to be able to grow reliable samples. In an effort to achieve this aim, the principal investigator was forced to take responsibility of the MBE growth as well - a situation not originally anticipated. Accordingly, major effort was spent making the USC MBE machine operational and putting in place basic support facilities (such as substrate cleaning and preparation). The situation with regard to the MBE machine thus, unfortunately, deprived us of appropriate GaAs/A1 Ga1-xAs samples to be able to proceed with certain experiments. We did, however, grow a few GaAs/A1x Ga1-xAs/GaAs tunnelling structures had them fabricated into actual tunnel structures, and carried ou Fowler-Norheim resonance tunnelling experiments at JPL. The results indicated that the interfacial quality of these structures were rather poor.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *MOLECULAR BEAMS, *SEMICONDUCTING FILMS, CLEANING, COMPUTERIZED SIMULATION, ELLIPSOMETERS, GROUP III COMPOUNDS, GROUP V COMPOUNDS, INTERFACES, LOGISTICS SUPPORT, MONTE CARLO METHOD,

AD-A185 520

AD-A185 520 CONTINUED

RELIABILITY, SPECTROSCOPY, STRUCTURES, SUBSTRATES, GALLIUM ARSENIDES, ALUMINUM GALLIUM ARSENIDE, CRYOPUMPING, TUNNELING(ELECTRONICS), STEADY STATE, KINETICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230681.

AD-A185 520

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 519 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Typical Cluster Size for 2-Dim Percolation Processes.

DESCRIPTIVE NOTE: Technical rept.,

DEC 86

PERSONAL AUTHORS: Nguyen, Bao G.

REPORT NO. TR-169

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1140

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this paper is to discuss some characteristics of the typical cluster size for the self-matching 2-dimensional percolation models. For simplicity the author only describes his results for the site percolation model on double Z squared and leaves the task of extending this discussion to general models to the readers. Let us now introduce the 2-dim site percolation model. Let P sub p denote the probability measure under which all sites of the lattice double Z squared are independently occupied (non-occupied) with probability p (respectively 1-p). It is said that x is connected to y if there is a nearest neighbor path over occupied sites connecting x and y. (Let W sub 0 = x is an element of double Z squared as 0 approaches x) the cluster of occupied sites connected to 0. This paper is devoted to the study of certain special properties of the typical cluster size about the critical point (p sub c = inf(p : P sub p (0 approaches infinity) > 0)).

DESCRIPTORS: (U) *CLUSTERING, *PERCOLATION, *MATHEMATICAL MODELS, LIMITATIONS, MODELS, PROBABILITY, SITES, SIZES(DIMENSIONS), TWO DIMENSIONAL, SCALING FACTORS, FREE ENERGY, THEORY.

AD-A185 519 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 513 20/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Analysis of a Delayed Delta Modulator.

DESCRIPTIVE NOTE: Journal article,

JUL 86 18P

PERSONAL AUTHORS: Gerr, Neil L.; Cambanis, Stamatis

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1141

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, vIT-32 n4 p496-512 Jul 86.

ABSTRACT: (U) While delta modulation (DM) simply compares the current predictive estimate of the input with the current sample, delayed delta modulation (DDM) also compares with the upcoming sample so as to detect and anticipate slope overloading. Since this future sample must be available before the present output is determined and the estimate updated, delay is introduced at the encoding. The performance of DDM with perfect integration and step-function reconstruction is analyzed for each of three random input signals. The stochastic stability of the system is established. For a discrete time, independent and identically distributed input, the (limiting) joint distribution of input and output is derived, and the (asymptotic) mean-square sample point error mse(SPE) is computed when the input is Gaussian. For a Wiener input, the joint distribution of the sample point and prediction errors is derived, and mse(SP) and the time-averaged mse (mse(TA)) are computed. For a stationary first-order Gauss-Markov input, the joint distribution of input and output is derived and mse(SP) and mse(TA) computed. Graphs of the mse's illustrate the improvement attainable by using DDM instead of DM. With optimal setting of parameters, mse(SP)(mse(TA)) is reduced about 15 percent(35 percent). (Reprints).

AD-A185 513 CONTINUED

DESCRIPTORS: (U) *DELAY CIRCUITS, *DELTA MODULATION, *CIRCUIT ANALYSIS, ERRORS, GRAPHS, INPUT, OPTIMIZATION, PREDICTIONS, REPRINTS, SETTING(ADJUSTING), SIGNALS, STABILITY, STOCHASTIC PROCESSES, TIME, DISCRETE DISTRIBUTION.

IDENTIFIERS: (U) DDM(Delay Delta Modulation), PE61102F, WUAFOSR2304AS.

AD-A185 513

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 507 12/9

MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA DEPT OF COMPUTER AND INFORMATION SCIENCES

(U) A Query Driven Computer Vision System: A Paradigm for Hierarchical Control Strategies during the Recognition Process of Three-fimensional Visually Perceived Objects.

DESCRIPTIVE NOTE: Final rept. 15 Jul 85-14 Jul 86,

SEP 86 26P

PERSONAL AUTHORS: Bajcsy, Ruzena

CONTRACT NO. F49620-85-K-0018

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-87-1161

UNCLASSIFIED REPORT

ABSTRACT: (U) We have developed a system called LANDSCAN, which is an integrated vision system and the recognition process is knowledge driven. This knowledge is generated by a query in English. The visual information is a stereo pair of images, and the description are being made on 3-dimensional information. Keywords: Computer applications, Image processing, Optical images, Natural language, Computer vision, Knowledge driven recognition, Scene analysis.

DESCRIPTORS: (U) *COMPUTER APPLICATIONS, *IMAGE PROCESSING, HIERARCHIES, IMAGES, INTEGRATED SYSTEMS, INTERROGATION, NATURAL LANGUAGE, OPTICAL IMAGES, RECOGNITION, THREE DIMENSIONAL, VISION, VISUAL PERCEPTION.

IDENTIFIERS: (U) *Computer Vision, LANDSCAN, IPON(Image Processing Optical Network), PE61102F, WUAFOSR2304A7.

AD-A185 501 12/4

CLEMSON UNIV SC DEPT OF MATHEMATICAL SCIENCES

(U) Algebraic Aspects of Computing Network Reliability.

DESCRIPTIVE NOTE: Technical rept.,

SEP 86 24P

PERSONAL AUTHORS: Shier, D. R.

REPORT NO. TR-517

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1129

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of calculating the two-terminal reliability of a network having edges that fail randomly and independently is known to be NP-hard, even in the case of directed acyclic networks. This paper discusses an iterative technique that provides at each iteration both upper and lower bounds on the exact reliability value. These bounds are shown to converge to the exact answer for the case of acyclic networks. Computational results indicate that for certain classes of graphs these bounds converge rapidly and provide excellent approximations to the true network reliability. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, *NETWORK ANALYSIS(MANAGEMENT), GRAPHS, ITERATIONS, NETWORKS, RELIABILITY, ALGORITHMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 488 12/2

CALIFORNIA INST OF TECH PASADENA DEPT OF APPLIED MATHEMATICS

(U) Periodic Orbits in Slowly Varying Oscillators,

MAY 87 21P

PERSONAL AUTHORS: Wiggins, Stephen; Holmes, Philip

CONTRACT NO. AFOSR-84-0051

MONITOR: AFOSR TR-87-1319

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Siam Jnl. of Mathematical Analysis, v18 n3 p592-611 May 87.

ABSTRACT: (U) This document develops a global perturbation technique for the study of periodic orbits in three dimensional, time dependent and independent, perturbations of planar Hamiltonian differential equations. The authors give existence, stability and bifurcation theorems and illustrate their results with examples that exhibit saddle-node an Hopf bifurcations of periodic orbits.

DESCRIPTORS: (U) *HAMILTONIAN FUNCTIONS, *ORBITS, *OSCILLATORS, *PERTURBATIONS, DIFFERENTIAL EQUATIONS, GLOBAL, PLANAR STRUCTURES, REPRINTS.

AD-A185 487 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strong Consistency of M-Estimates for the Linear Model.

DESCRIPTIVE NOTE: Technical rept.,

JUL 87 19P

PERSONAL AUTHORS: Chen, X. R.; Wu, Yeuhua

REPORT NO. TR-87-24

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-0971

UNCLASSIFIED REPORT

ABSTRACT: (U) Let (sub 1),...,(sub n),... be i.i.d. observations of a random vector (X,Y) were Y is one-dimensional and X may be multi-dimensional. Suppose that the regression of Y to X, in some sense, is a linear function alpha sub o + beta sub o. It is desired to estimate the unknown parameters alpha sub o, beta sub o, using the observations (sub 1),...(sub n,). A much discussed class of estimates is the so-called M-estimate, which takes the solution of a certain minimization problem as the estimator. Here rho is a properly selected function defined over R' = (infinity). (Keywords: linear models).

DESCRIPTORS: (U) *ESTIMATES, *MATHEMATICAL MODELS, FUNCTIONS(MATHEMATICS), LINEAR SYSTEMS, LINEARITY, CONSISTENCY, MULTIVARIATE ANALYSIS.

IDENTIFIERS: (U) M estimates, Minimization, WUAFOSR2304A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 486 12/7

NEW MEXICO UNIV ALBUQUERQUE DEPT OF MATHEMATICS AND STATISTICS

(U) DoD-University Instrumentation Program FY 85.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-28 Feb 87,

MAY 87 19P

PERSONAL AUTHORS: Steinberg, Stanly; Kyner, W. T.; Gibson, Archie G.

CONTRACT NO. AFOSR-85-0092

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1173

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant consisted of two parts: the installation of a Local Area Network and the installation of a network of four graphics workstations. The Local Area Network (LAN) was operational in June of 1986. The department has about 25 terminals connected to the network. Most of the terminals are located in the offices of the faculty and graduate students, with a few in a joint-use equipment room. The response is that this has greatly improved the departmental computing environment. In addition, 7 faculty members have been given microcomputers by the university of New Mexico and these have been connected to the LAN. This configuration seems to provide an excellent computing environment. Some of the faculty have found that current microcomputers are too small and have too little software, so the University will hopefully replace some of these with more powerful micros, which will also be connected to the LAN. This network has and will continue to have a substantial impact on the research and teaching in the department. However, there is no easy way to verify this except through the informal reports of the people using the system. The network of workstations was operational in August of 1985. The network of workstation consists of four Sun-2/160 minicomputers; each has a tape and disk drive. These are connected via an ethernet, which is

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connected to the university CDCN. The Sun workstations have been upgraded to Sun-3 class workstations; three of the workstations have 4-megabyte memories while one has a 8-megabyte memory; one has floating point accelerator.

DESCRIPTORS: (U) *COMMUNICATIONS NETWORKS, *COMPUTER COMMUNICATIONS, DISKS, DRIVES, COMPUTER PROGRAMS, MICROCOMPUTERS, MICROCOMPUTERS, NETWORKS, STATIONS, FLOATING POINT OPERATION.

IDENTIFIERS: (U) LAN(Local Area Networks), *Computer networks, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 482 11/4 11/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

(U) Exploitation of the Sol-Gel Route in Processing of Ceramics and Composites.

DESCRIPTIVE NOTE: Final rept. 15 May 85-14 May 87,

JUL 87 106P

PERSONAL AUTHORS: Roy, Rustum

CONTRACT NO. F49620-85-C-0069

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1193

UNCLASSIFIED REPORT

ABSTRACT: (U) Compositionally diphasic xerogels. These materials are very intimate mixtures composed of two solid phases each on the order of 10-20 nm. The two phases are only different in composition. Using the mullite (3A1203Si02) system as the prototype model, we have shown that the compositionally diphasic materials sinter to a much lower temperature than the single phase gels. Such sintering of compositionally diphasic gels at much lower temperatures may be attributed, at least in part, to the heat of reaction of the two discrete phases at the sintering temperature. This notion was extended to other systems such as Al2Ti05, ZrSi04, ThSi04 and Mg2Al4Si018. Results to data on the Al2Ti05, ZrSi04 and ThSi04 systems do not show significant improvements in densification behavior although the use of diphasic gels lea to a lowering in the crystallization temperatures of ZrSi04, ThSi04, etc. The diphasic Mg2Al4Si5018 system exhibits metastable melting which could be used for enhanced densification of this low-expansion ceramic. Using the diphasic approach, we have also prepared translucent ultra-low expansion titania-silica glasses with 0 to 10% Ti02. The coefficients of thermal expansion are intermediate between those of fused silica and a commercial titania-silica glass. The glass with 7.2% Ti02 exhibited a zero thermal expansion coefficient at 150-210

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AD-A185 482 CONTINUED

C.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *COMPOSITE MATERIALS, COEFFICIENTS, FUSED SILICA, GELS, HEAT OF REACTION, LOW TEMPERATURE, MELTING, METASTABLE STATE, MODELS, PROCESSING, PROTOTYPES, SINTERING, SOLID PHASES, TEMPERATURE, THERMAL EXPANSION.

IDENTIFIERS: (U) PE61102F, WUAFUSR2303A3.

AD-A185 482

AD-A185 480 12/1

CITY COLL NEW YORK

(U) Error Bounds for Exponential Approximations to Geometric Convolutions.

DESCRIPTIVE NOTE: Journal article,

AUG 86 27P

PERSONAL AUTHORS: Brown, Mark

REPORT NO. CUNY-MB-84-03

CONTRACT NO. AFOSR-84-0095

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-87-1032

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper defines Y sub 0 to be a geometric convolution of X if Y sub 0 is the sum of N sub 0 i.i.d. random variables distributed as X, where N sub 0 is geometrically distributed and independent of X. It is known that if X is non-negative with finite second moment then as p approaches limit of 0, Y sub 0/EY sub 0 converges in distribution to an exponential distribution with mean 1. Derive is an upper bound for d(Y sub 0), the distance between Y sub 0 and an exponential with mean Y sub 0, namely for 0<p < or = 1/2, d(sub 0) < or = cp where c = sq ex/sq (ex). This bound is asymptotically (p approaches limit of 0) tight.

DESCRIPTORS: (U) *EXPONENTIAL FUNCTIONS, *DISTRIBUTION THEORY, *CONVOLUTION, APPROXIMATION(MATHEMATICS), MOMENTS, RANDOM VARIABLES, CONVERGENCE, QUEUEING THEORY.

IDENTIFIERS: (U) Error bounds, *Geometric convolutions.

AD-A185 480

AD-A185 466 20/4

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF ENGINEERING SCIE NCE AND MECHANICS

(U) Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.

DESCRIPTIVE NOTE: Final rept. 1 Feb 84-28 Feb 87,

JUN 87 78P

PERSONAL AUTHORS: Herbert, Thorwald

CONTRACT NO. F49620-84-K-0002

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-0981

UNCLASSIFIED REPORT

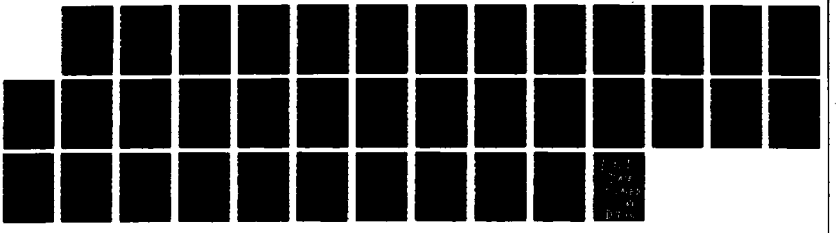
ABSTRACT: (U) A unified theory of secondary instability in wall-bound shear flows has been developed. This theory rests on Floquet systems of stability equations and permits classification and quantitative analysis of different modes of secondary instability in the three-dimensional stage of laminar-turbulent transition. The catalogue of solutions is consistent with observations and predicts other phenomena that have not been identified in experiments. The theoretical results have been used to reproduce patterns in flow visualizations by computer animation. Analysis of the energy balance has shown a feedback loop between mean flow, two-dimensional, and three-dimensional disturbances that is considered key to the process of self-sustained transition. Various techniques have been developed to investigate details of the nonlinear three-dimensional processes involved in this feedback loop. Keywords: Boundary layer, Stability, Transition.

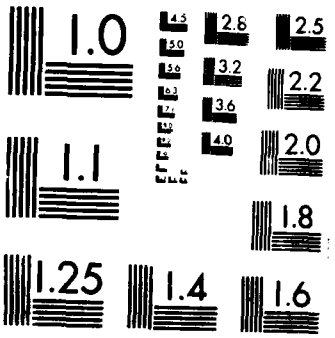
DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *BOUNDARY LAYER TRANSITION, BALANCE, BOUNDARY LAYER, CATALOGS, ENERGY, EQUATIONS, FEEDBACK, FLOW, FLOW VISUALIZATION, LAMINAR FLOW, LOOPS, MEAN, NONLINEAR SYSTEMS, QUANTITATIVE ANALYSIS, SECONDARY, SOLUTIONS(GENERAL), STABILITY, STRUCTURES, THEORY, THREE DIMENSIONAL, TRANSITIONS,

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AD-A198 119 AFOSR TECHNICAL SUMMARIES(U) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC D TYRRELL MAR 88 AFOSR-TR-88-0757 8/8

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 466 CONTINUED

TURBULENCE, TURBULENT FLOW, STRUCTURAL PROPERTIES, WALLS, TWO DIMENSIONAL FLOW, SHEAR PROPERTIES, COMPUTER GRAPHICS, THREE DIMENSIONAL FLOW.

IDENTIFIERS: (U) Shear flow, Instability, PE61102F, WUAFOSR2307A2.

AD-A185 466

AD-A185 465 20/4 12/2

INDIANA UNIV-PURDUE UNIV AT INDIANAPOLIS SCHOOL OF ENGINEERING AND TECHNOLOGY

(U) A Zonal Approach for the Solution of Coupled Euler and Potential Solutions of Flows with Complex Geometries.

DESCRIPTIVE NOTE: Final rept. 1 Jun 83-31 May 87,

JUN 87 156P

PERSONAL AUTHORS: Ecer, Akin

REPORT NO. ET-S87-2

CONTRACT NO. F49620-83-K-0034

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-87-1350

UNCLASSIFIED REPORT

ABSTRACT: (U) A block-structured solution scheme was developed for the solution of three-dimensional Euler equations around complex geometric configurations. The overall effort included the development of a block-structured solution of both potential and Euler equations. The flow field around a complex geometry is divided into blocks with simple geometries. The computational grid is generated individually for each of the blocks and coupled automatically. For each of the blocks, either potential of Euler equations are solved independently using the finite element method. The normal mass and entropy fluxes are balanced between the blocks iteratively by using a relaxation scheme. This scheme is implemented on large computers (Cray and IBM) using parallel precessing capabilities such as asynchronous I/O and several CPU's. Keywords: Transonic flow; Three dimensional; Airfoils; F-16 Aircraft. (Author)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *TRANSONIC FLOW, AIRFOILS, COMPUTATIONS, COUPLING(INTERACTION), ENTROPY, FINITE ELEMENT ANALYSIS, FLOW FIELDS, FLUX(RATE), GEOMETRIC FORMS, GEOMETRY, GRIDS, MASS, RELAXATION, SOLUTIONS(GENERAL), THREE DIMENSIONAL, INPUT OUTPUT

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PROCESSING, PARALLEL PROCESSING, FLOW.

IDENTIFIERS: (U) *Enter equations, F-16 aircraft, PE61102F, WUAFOSR2307A1.

AD-A185 459 12/3

SCIENTIFIC SYSTEMS INC CAMBRIDGE MA

(U) Development of Statistical Methods Using Predictive Inference and Entropy.

DESCRIPTIVE NOTE: Final technical rept.,

MAR 86 75P

PERSONAL AUTHORS: Larimore, Wallace E.

REPORT NO. SSI-1112

CONTRACT NO. F49620-85-C-0086

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1336

UNCLASSIFIED REPORT

ABSTRACT: (U) In this Phase I study funded under the Small Business Innovation Research (SBIR) program, statistical methods are developed using the predictive inference and entropy approach. Previous recent research has derived entropy as the natural measure of model approximation error from the fundamental statistical principles of sufficiency and repeated sampling. In this study, the areas of nonnested multiple comparison, multivariable time series analysis, adaptive time series analysis of changing processes, and optimal small sample inference are investigated. Constrained maximum likelihood methods are developed for general nonnested multiple comparison. For the asymptotic optimality of these methods, a condition on the Fisher information and Hessian matrices must be satisfied. Applying these results to multivariate time series analysis, lower bounds are derived for the achievable accuracy of the estimated transfer function and spectral matrices. Markov and canonical variate analysis (CVA) provide a means of numerically and statistically stable model fitting of multivariable time series, and these methods provide a basis for modeling fitting time varying models of changing processes.

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DESCRIPTORS: (U) *STATISTICAL PROCESSES, *STATISTICAL INFERENCE, *ENTROPY, MAXIMUM LIKELIHOOD ESTIMATION, MULTIVARIATE ANALYSIS, TIME SERIES ANALYSIS, OPTIMIZATION, STATISTICAL SAMPLES, ASYMPTOTIC NORMALITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A185 459

AD-A185 458 6/2 6/1

CALIFORNIA UNIV SAN FRANCISCO

(U) Molecular Cloning of Adenosinediphosphoribosyl Transferase.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-31 Aug 87,

SEP 87 67P

PERSONAL AUTHORS: Kun, Ernest

CONTRACT NO. $AFOSR-85-0377

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-87-0982

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of obtaining the gene of Adenosinediphosphoribosyl Transferase (ADPRT) is: 1) the complete amino acid sequence of this large protein is best determined from the DNA sequence of the gene, 2) isolation of the gene provides gene probes that permit location and quantitation of the gene within genomic DNA, and 3) a variety of biological experiments at the cellular level requires specific gene probes. The DNA-associating enzyme, adenosinediphosphoribosyl transferase, has been isolated from calf thymus by selective precipitation with a solution of dihydroxy-Reactive Red 120, followed by extraction of the enzyme from the precipitate with 2 M KCl and an on-line train of three successive column chromatographic steps, including a final 3-aminobenzamide-Sepharose-4B affinity chromatography. The method yields 8-9 mg of more than 95% homogeneous enzyme protein per kg starting material and requires about 3 working days. This dye precipitation method is distinct from affinity precipitation, since it involves the binding of the dye to both nonspecific sites and the substrate- and DNA-site of the transferase as indicated by enzyme inhibition by dihydroxy Reactive red 120 at both enzyme sites.

DESCRIPTORS: (U) *PHOSPHORUS TRANSFERASES, *CLONES, GENES, AMINO ACIDS, MAPPING, MOLECULAR STRUCTURE,

AD-A185 458

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 458 CONTINUED

DEOXYRIBONUCLEIC ACIDS, CHROMATOGRAPHY, THYMUS, PEPTIDES, DYES, BOVINES.

IDENTIFIERS: (U) ADPRT(Adenosinediphosphoribosyl Transferase), ELISA(Enzyme Linked Immunosorbent Assay), PE61102F, WUAFOSR2312A5.

AD-A185 458

AD-A185 432 3/2 3/1

CALIFORNIA INST OF TECH PASADENA SOLAR ASTRONOMY GROUP

(U) The Appearance and Disappearance of Magnetic Flux on the Quiet Sun.

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-31 Dec 86,

JUL 87 19P

PERSONAL AUTHORS: Zirin, Harold; Martin, Sara F.

CONTRACT NO. $AFOSR-82-0018

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR TR-87-1346

UNCLASSIFIED REPORT

ABSTRACT: (U) This project yielded the following significant new discoveries and findings about solar magnetic fields: The majority of magnetic flux on the sun is observed to disappear when magnetic fields of one polarity migrate into or develop in juxtaposition with fields of opposite polarity. The cancellation of magnetic fields can be interpreted as: (a) submergence (b) reconnection or (c) dissipation (annihilation) of magnetic fields. Large-scale filaments are observed to form in the chromosphere immediately above the boundaries between areas of network magnetic field of opposite polarity where network cancellation occurs. Small-scale filaments develop in association with small-scale cancelling magnetic fields at the rate of hundreds per day. Magnetic fields associated with large-scale solar convection cells, known as intranetwork magnetic fields, can be detected everywhere on the visible disk of the sun by using the videomagnetograph to integrate successive, 1/15 sec. magnetic field images for intervals of 1 to 10 minutes. The intranetwork field appear to be a few seconds of arc in diameter, and have field strengths of the order of a few Gauss to tens of Gauss. The intranetwork fields appear to originate at the centers of supergranules and flow to the boundaries of the cells in approximately radial patterns.

AD-A185 432

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ5CD

AD-A185 432 CONTINUED

DESCRIPTORS: (U) *SOLAR ACTIVITY, *MAGNETIC FIELDS, CHROMOSPHERE, TIME STUDIES, CONVECTION, SOLAR FLARES, FORECASTING.

IDENTIFIERS: (U) Solar filaments, Magnetographs, Solar supergranules, WUAFOSR2311A1, PE61102F.

AD-A185 432

AD-A185 422 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Extrema of Skewed Stable Processes.

DESCRIPTIVE NOTE: Technical rept.,

JUN 87 38P

PERSONAL AUTHORS: Samorodnitsky, Gennady

REPORT NO. TR-189

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1143

UNCLASSIFIED REPORT

ABSTRACT: (U) This document extremes of (generally) skewed stable processes. In particular the author finds the asymptotic behavior of the distribution function of the order statistics from a (dependent) stable sample. Given are necessary conditions for a.s. boundedness of general stable processes. These conditions turn out to be sufficient when 0 < alpha < 1. Further, asymptotic lower bounds 0 < alpha < 1 those bounds are shown to give the exact asymptotic behavior of the supremum and infimum distribution functions.

DESCRIPTORS: (U) *SKEWNESS, DISTRIBUTION FUNCTIONS, STOCHASTIC PROCESSES, ORDER STATISTICS, STABILITY, RANGE(EXTREMES), ASYMPTOTIC NORMALITY, RANDOM VARIABLES, INTEGRALS, PROBABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 422

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 408 12/3

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Robust Prediction Operations for Stationary Processes.

DESCRIPTIVE NOTE: Technical rept.,

AUG 87 28P

PERSONAL AUTHORS: Kazakos, P. P.

REPORT NO. UVA/525682/EE88/101

CONTRACT NO. $AFOSR-87-0224

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1085

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers prediction for stationary processes, in environments where data outliers may be present. The develops a sequence of outlier resistant prediction operations, which is 'uniformly qualitatively robust. Studied are the asymptotic mean-squared performance of the developed operations, both in the absence and the presence of i.i.d. data outliers. Important performance characteristics studied include the breakdown point and the influence function. (Author)

DESCRIPTORS: (U) *MATHEMATICAL PREDICTION, *STOCHASTIC PROCESSES, STATIONARY, ASYMPTOTIC NORMALITY, RESISTANCE.

IDENTIFIERS: (U) *Outliers, robustness, autoregression analysis, PE61102F, WUAFOSR2304A5.

AD-A185 408

AD-A185 407 12/3

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Comparing Dispersion Effects at Various Levels of Factors in Factorial Experiments.

DESCRIPTIVE NOTE: Technical rept. Dec 86-Aug 87,

AUG 87 13P

PERSONAL AUTHORS: Ghosh, Subir; Lagergren, Eric S.

REPORT NO. TR-159

CONTRACT NO. $AFOSR-87-0048

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1086

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper is an attempt to understand, measure and compare dispersion effects at different levels of factors in factorial experiments. The simplest setting is considered in order to develop better comprehension and insight. The properties of the proposed descriptive measures are examined. A method of adjusting residuals and its use in comparing dispersion effects are discussed. Illustrative examples are also given. The problem considered in this paper arises in quality control studies and the methodologies are applicable to industrial experiments. (Author)

DESCRIPTORS: (U) *FACTORIAL DESIGN, *DISPERSIONS, *EXPERIMENTAL DESIGN, MEASUREMENT, RESIDUALS, OPTIMIZATION, QUALITY CONTROL, COMPARISON, MATRICES(MATHEMATICS), MATHEMATICAL MODELS, LINEARITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A185 407

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 406 20/4

DAYTON UNIV OH RESEARCH INST

(U) Asymptotic Analysis of a Turbulent Boundary Layer in a Strong Adverse Pressure Gradient.

DESCRIPTIVE NOTE: Interim rept. 1 Jan-31 Jul 87,

JUL 87 57P

PERSONAL AUTHORS: Bush, William B.; Krishnamurthy, L.

CONTRACT NO. F49420-85-C-0137

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-0962

UNCLASSIFIED REPORT

ABSTRACT: (U) The structure of an incompressible turbulent boundary layer subjected to a strong adverse pressure gradient is studied by means of an asymptotic analysis of the Reynolds time-averaged equations. Limit-process expansions developed in the limit of large Reynolds number reveal a relatively thick nondefect layer in the outer region of the boundary layer near the exterior inviscid flow, and a relatively thin layer near the wall. To leading orders of approximation, the momentum balance involves convection, pressure gradient, and turbulent stress in the outer layer, and pressure gradient, and turbulent and viscous stresses in the inner layer. The asymptotic expansions for these two layers are matched in an arbitrary intermediate region, wherein the streamwise velocity has a square-root dependence and the Reynolds stress has a corresponding linear dependence on the normal coordinate. The leading-order approximations for the outer and inner layers give rise to similarity formulations, from which appropriate similarity formulations for the distinguished intermediate layer have been identified and developed. These latter formulations are employed to analyze available experimental data.

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *INCOMPRESSIBLE FLOW, SHEAR STRESSES, REYNOLDS NUMBER,

AD-A185 406

AD-A185 406 CONTINUED

ASYMPTOTIC SERIES, PRESSURE GRADIENTS, INVISCID FLOW, CONVECTION, VISCOSITY, EQUATIONS OF MOTION.

IDENTIFIERS: (U) Reynolds stresses, PE61102F, WUAFOSR2304A3.

AD-A185 406

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 405 12/1

MARYLAND UNIV BALTIMORE COUNTY CATONSVILLE DEPT OF MATHEMATICS

(U) Numerical Methods for Reaction-Diffusion Problems with Non-Differentiable Kinetics.

DESCRIPTIVE NOTE: Summary rept.,

NOV 86 23P

PERSONAL AUTHORS: Aziz, A. K.; Stephens, A. B.; Suri, Manil

REPORT NO. UMBC-MRR-86-2

CONTRACT NO. $AFOSR-85-0322

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1036

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers a class of steady-state semi- linear reaction-diffusion problems with non-differentiable kinetics. The analytical properties of these problems have received considerable attention in the literature. The first step in analyzing their numerical approximation is taken. The authors present a finite element method and establish error bounds which are optimal for some of the problems. In addition, a finite difference approach is also discussed. Numerical experiments for one-and two-dimensional problems are reported. (Author)

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), FINITE ELEMENT ANALYSIS, FINITE DIFFERENCE THEORY, ERROR ANALYSIS, CONVERGENCE, STEADY STATE, THEOREMS, ONE DIMENSIONAL, TWO DIMENSIONAL, DIFFUSION, REACTION KINETICS, OPTIMIZATION.

IDENTIFIERS: (U) Error bounds, PE61102F, WUAFOSR2304A3.

AD-A185 404 12/2 9/1

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF MATHEMATICS

(U) The Numerical and Analytic of Implicit Differential Equations and Their Application to Control and Circuit Problems.

DESCRIPTIVE NOTE: Final rept. 16 Jul 84-15 Jan 87,

FEB 87 14P

PERSONAL AUTHORS: Campbell, Stephen L.

CONTRACT NO. $AFOSR-84-0240

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-87-1151

UNCLASSIFIED REPORT

ABSTRACT: (U) Results on the numerical and analytic solution of implicit systems of differential equations and their application to circuit and control problems were developed. In particular, the first general algorithm for the linear time varying case was developed along with an analysis of how to apply it to certain control problems. New structure theorems provide insight on the convergence of backward differentiation formulas and guidelines for their use. (Author)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *CONTROL SYSTEMS, *CIRCUITS, NUMERICAL METHODS AND PROCEDURES, ALGORITHMS.

IDENTIFIERS: (U) Implicit equations, Singular systems, Descripter systems, Backward differentiation, Convergence, PE61102F, WUAFOSR2304A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 403 11/4 13/3 14/2

COLORADO UNIV AT BOULDER DEPT OF CIVIL ENVIRONMENTAL AND ARCHITECTURAL ENGINEE RING

(U) Strength, and Behavior of Steel Fiber-Reinforced Concrete and Soil Structures Interaction Studies.

DESCRIPTIVE NOTE: Final rept. 15 Jan 81-31 Aug 84,

JUN 87 18P

PERSONAL AUTHORS: Ko, Hon-Him

CONTRACT NO. $AFOSR-81-0072

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR TR-87-1332

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes two phases of the research project. The first phase dealt with the strength and behavior of steel fiber reinforced concrete subjected to biaxial compression-tension loadings. A new piece of direct tension loading apparatus was designed and assembled for this study. Load history effects on the degradation of the tensile strength were also investigated. The second dealt with the modeling of a buried culvert system, both numerically and in the geotechnical centrifuge. The centrifuge test results were compared to the numerical analytical results to provide a validation of the numerical algorithm in which constitutive models could be incorporated.

DESCRIPTORS: (U) *STRESS TESTING, *REINFORCED CONCRETE, *LOADS(FORCES), *COMPRESSION, FIBERS, STEEL, DESTRUCTIVE TESTS, BIAXIAL STRESSES, CRACKING(FRACTURING), TEST AND EVALUATION, FIBER REINFORCEMENT, CENTRIFUGES, SIMULATION, BURIED OBJECTS.

IDENTIFIERS: (U) *Compression-tension loads, PE61102F, WUAFOSR2302C2.

AD-A185 403

AD-A185 402 7/3 7/2

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) New Organic and Organometallic Materials with Nonlinear Optical Properties for Optical Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-30 Sep 86,

SEP 86 51P

PERSONAL AUTHORS: Cowan, Dwaine O.; Robinson, Dean W.

CONTRACT NO. $AFOSR-84-0363

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1180

UNCLASSIFIED REPORT

ABSTRACT: (U) Of the molecules measured with EFISH there is a striking constancy of their microbeta products and even the more approximate beta's themselves. These molecules are all nitrobenzene derivatives and the observation could be made that the magnitude of beta is more or less tied to this conjugated portion of the molecules. Comparison of the power data with the molecular hyperpolarizabilities illustrates that a study of powder response tells essentially nothing whatever about molecular properties. Attention should be directed to crystal studies in the search for materials destined for application to the processing of weak optical signals. The dependence of molecular polarizability on concentration in some solvents for some solutes at very low concentrations has not been clearly seen before. These measurements were all made on solutions of less than 1 molecular percent and so solute-solute interaction almost certainly is absent.

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, CHLORINE, MERCURY, SODIUM, OPTICAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A185 402

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 401 1/3.12 1/1

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Computational Methods for Problems in Aerodynamics and Large Space Structure Using Parallel and Vector Architectures.

DESCRIPTIVE NOTE: Final rept.,

87 7P

PERSONAL AUTHORS: Gottlieb, David

CONTRACT NO. $AFOSR-85-0303

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1189

UNCLASSIFIED *REPORT*

ABSTRACT: (U) One paper produced in this effort dealt with the importance of intermediate boundary conditions for approximate factorization schemes. A second paper derived stability results for spectral methods applied to initial-boundary value problems for hyperbolic systems. The paper demonstrates that one can bound certain weighted L2 spatial norms of the solution in terms of norms of the boundary data. A third paper deals with domain decomposition methods in the content of spectral techniques. Stability and convergence results are obtained for one and two dimensional cases.

DESCRIPTORS: (U) *AEROSPACE CRAFT, *AERODYNAMIC FORCES, NAVIER STOKES EQUATIONS, BOUNDARY VALUE PROBLEMS, WEIGHTING FUNCTIONS, CONVERGENCE, STABILITY, POTENTIAL FLOW, TRANSONIC CHARACTERISTICS, LEGENDRE FUNCTIONS, CHEBYSHEV APPROXIMATIONS.

IDENTIFIERS: (U) Computational fluid dynamics, Hyperbolic equations, Initial value problems, PE61102F, WUAFOSR2304A3.

AD-A185 400 20/7 14/2 20/2

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Molecular Beam Epitaxial Growth and Characterization of III-V Compound Semiconductor Single and Multiple Interface Structures.

DESCRIPTIVE NOTE: Final rept. 30 Jul 84-29 Oct 86,

OCT 86 6P

PERSONAL AUTHORS: Madhukar, Anupam

CONTRACT NO. $AFOSR-84-0279

PROJECT NO. 2917

TASK NO. A9

MONITOR: AFOSR
TR-87-1177

UNCLASSIFIED REPORT

ABSTRACT: (U) A brief description of equipment acquired under the present grant is provided, along with a list of equipment. The equipment has enhanced molecular beam epitaxial growth and characterization capabilities in the principal investigator's laboratory.

DESCRIPTORS: (U) *MOLECULAR BEAMS, *LABORATORY EQUIPMENT, *EPITAXIAL GROWTH, ELLIPSOMETERS, POWER SUPPLIES, VACUUM APPARATUS, MASS SPECTROMETERS, QUADRUPOLE MOMENT, DRYING APPARATUS, ELECTRON MICROSCOPES, OPTICAL EQUIPMENT COMPONENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 398 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Point Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 86-Sep 87,

MAY 87 88P

PERSONAL AUTHORS: Serfozo, Richard F

REPORT NO. TR-185

CONTRACT NO. F49620-85-C-0144, $AFOSR-84-0367

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1105

UNCLASSIFIED REPORT

ABSTRACT: (U) This document describes the structure of most of these processes and discuss some of their basic properties. The coverage does not include several important topics requiring lengthy mathematical development (e.g. martingale theory of point processes, general Palm probabilities, and ergodic and spectral analysis of stationary processes). The emphasis will be one presenting tools for modeling stochastic systems rather than on applications of the tools. Although the theory of point processes is intimately connected with the subject of measure and integration (a point process is a random counting measure). The author focused on results that can be understood without a deep knowledge of measure theory. On the other hand, the presentation will be rigorous and at the level of the applied probability literature that one would encounter in studying point processes. (Author)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, MATHEMATICAL MODELS, TIME INTERVALS, POINTS(MATHEMATICS), PROBABILITY, STATIONARY, CONVERGENCE.

IDENTIFIERS: (U) *Point processes, WUAFOSR2304A5, PE61102F.

AD-A185 398

AD-A185 395 20/6

OREGON UNIV EUGENE INST OF THEORETICAL SCIENCE

(U) The Production of Ultrasmall and Superfine Holographic Diffraction Gratings Using Synchrotron Radiation and Lithographic Techniques.

DESCRIPTIVE NOTE: Annual rept. (Final) 1 Sep 85-31 Dec 86,

FEB 87 21P

PERSONAL AUTHORS: Csonka, Paul L.

CONTRACT NO. $AFOSR-85-0326

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-87-0963

UNCLASSIFIED REPORT

ABSTRACT: (U) The research effort was directed toward the production of superfine X-ray gratings by holographic means, i.e. generating an interference pattern by X-rays emitted in the form of synchrotron radiation from a high energy electron storage ring, recording the pattern on a resist, such as PMMA, and subsequently transferring it onto metal.

DESCRIPTORS: (U) *GRATINGS(SPECTRA), *PHOTOLITHOGRAPHY, *HOLOGRAPHY, X RAY DIFFRACTION, HIGH RESOLUTION, INTERVALS, SHORT RANGE(DISTANCE), FABRICATION, POLYMETHYL METHACRYLATE.

IDENTIFIERS: (U) WUAFOSR2301A1, PE61102F.

AD-A185 395

AD-A185 393 11/6.1

DREXEL UNIV PHILADELPHIA PA DEPT OF MATERIALS ENGINEERING

(U) A Fundamental Study of P/M Processed Elevated Temperature Aluminum Alloys.

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-30 Sep 86,

JUL 87 38P

PERSONAL AUTHORS: Lawley, A.; Koczak, M. J.

CONTRACT NO. $AFOSR-82-0010

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-0964

UNCLASSIFIED REPORT

ABSTRACT: (U) Ambient and elevated temperature tensile and creep response, and microstructural stability of a powder processed AL-Fe-Ce alloy have been evaluated. Gas atomized Al-Fe-C was mechanically alloyed (MA) to give a volume fraction of dispersoids of about 0.23. The powder was could isostatica4ly pressed in aluminum cans, outgassed and hot extruded to full density. Consistent with improved microstructural stability at elevated temperatures, the MA material is stronger and more creep resistant than the non-MA material. These improvements are attributed to the presence of fine scale oxides and carbides distributed uniformly throughout the structure, and which are introduced during MA; the dispersion inhibits coarsening, recovery and recrystallization. Non-MA Al-Fe-Ce is stronger than non-MA Al-Fe-Ni at all temperatures but it has limited ductility. Qualitatively, the effect of MA on Al-Fe-Ce is similar to that in Al-Fe-Ni. These results suggest that Ce alters the transformation characteristics of Al-Fe and/or that Ce diffuses more slowly that Ni in Al, in the presence of Fe.

DESCRIPTORS: (U) *CREEP, *POWDER METALLURGY, *ALUMINUM ALLOYS, EXTRUSION, CRACKING(FRACTURING), ALUMINUM, NICKEL, IRON, CERIUM, OXIDES, CARBIDES.

AD-A185 393

AD-A185 393 CONTINUED

IDENTIFIERS: (U) *Creep response, MA(Mechanically Alloyed), WUAFOSR2306A1, PE61102F.

AD-A185 392 20/11

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING

(U) Three-Dimensional Non-Axisymmetric Anisotropic Stress Concentrations.

DESCRIPTIVE NOTE: Final rept. 2 Jan 82-30 Sep 84,

MAY 85 128P

PERSONAL AUTHORS: Zureick, Abdul H.; Eubanks, Robert A.

REPORT NO. UILU-ENG-85-2004, SAS-519

CONTRACT NO. $AFOSR-82-0047

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-87-1347

UNCLASSIFIED REPORT

ABSTRACT: (U) Unified explicit analytical solutions for the (non-axisymmetric) first and second boundary value problems of elasticity theory for a spheroidal cavity embedded in a transversely isotropic medium are presented. The analysis is based upon solutions of the homogeneous displacement equations of equilibrium in terms of three quasi-harmonic potential functions, each of which is harmonic in a space different from the physical space. Thus, three spheroidal coordinate systems with different metric scales (one for each potential) are introduced such that the three coordinate systems coincide on the spheroidal cavity. These potential functions are taken in a unique combination of the associated Legendre functions of the first and second kind. Extensive numerical data are obtained for the stress concentration factors associated with axisymmetric and non-axisymmetric problems for a variety of materials. The effect of anisotropy on the stress concentration factor is discussed in much greater detail than has been previously available in the literature.

DESCRIPTORS: (U) *STRESS CONCENTRATION, COMPOSITE MATERIALS, SPHERES, ANISOTROPY, BOUNDARY VALUE PROBLEMS, CAVITIES, LEGENDRE FUNCTIONS, THREE DIMENSIONAL,

AD-A185 392

AD-A185 392 CONTINUED

ISOTROPISM.

IDENTIFIERS: (U) *Quasiharmonic functions, *Inclusions, Elasticity.

AD-A185 387 22/2 20/11

WEA CAMBRIDGE MA

(U) Computation of Natural Frequencies of Planar Lattice Structure.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 85-1 Mar 87,

MAR 87 65P

PERSONAL AUTHORS: Williams, James H., Jr.; Nagem, Raymond J.

CONTRACT NO. F49620-85-C-0148

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-87-1006

UNCLASSIFIED REPORT

ABSTRACT: (U) Transfer matrices and joint coupling matrices are used to compute natural frequencies of vibration of a five-bay planar lattice structure. The method of analysis may be applied to general two and three-dimensional lattices. The necessary numerical computations may be performed easily with a personal computer. Numerical results for the first twenty-five nonzero natural frequencies of the five-bay planar lattice structure are given for the case when the members of the lattice are modeled as Bernoulli-Euler beams, and for the case when the members of the lattice are modeled as Timoshenko beams. The maximum difference in the computed natural frequencies of the two models occurs in the twenty-fifth mode and is less than one-half of one percent. The natural frequencies obtained here agree within six percent with the natural frequencies obtained in a previous analysis using a finite element method and an experimental modal analysis.

DESCRIPTORS: (U) *STRUCTURAL MEMBERS, *LATTICE DYNAMICS, VIBRATION, TRANSFER FUNCTIONS, MATRICES(MATHEMATICS), SPACE SYSTEMS, RESONANT FREQUENCY, FINITE ELEMENT ANALYSIS, TIMOSHENKO BEAM.

IDENTIFIERS: (U) Bernoulli Euler beam, PE61102F,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 386 4/1 8/4

ALASKA UNIV FAIRBANKS GEOPHYSICAL INST

(U) The Polar Ionosphere and Interplanetary Field.

DESCRIPTIVE NOTE: Final rept. 1 Jul 85-30 Jun 87,

AUG 87

PERSONAL AUTHORS: Watkins, B. J.; Akasofu, S. I.

CONTRACT NO. $AFOSR-85-0258

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-87-1342

UNCLASSIFIED REPORT

ABSTRACT: (U) The model ionosphere was developed that is coupled to a magnetospheric model for investigating time dependent behavior of the Polar F-region ionosphere in response to varying interplanetary magnetic field (IMF) configurations. The numerical ionospheric model covers a latitude range from 50 to 90 degrees and an altitude range of 150 to 600 KM. The purpose of the magnetospheric model is to define the location and geometry of the polar cap, which is defined as the region of open field lines. The polar cap configuration has been coupled to a model electric field pattern that in turn may vary in size and strength in response to the IMF. The ionosphere model assumes only oxygen ions; the ion density is solved vertically along many magnetic field lines as they move horizontally under the influence of the large-scale convective electric fields. The lower boundary is defined by the local chemistry and the upper boundary condition has been set by applying an outward flux of ions appropriate for open field line conditions. The model has been used to illustrate ionospheric behavior during geomagnetic storms conditions. Future model applications may include ionospheric prediction using IMF inputs improved understanding of polar ionization structures.

DESCRIPTORS: (U) *IONOSPHERIC MODELS, *MAGNETOSPHERE, CORRELATION, MAGNETIC FIELDS, INTERPLANETARY SPACE, MAGNETIC STORMS, POLAR REGIONS, F REGION, ATMOSPHERIC

AD-A185 386

AD-A185 386 CONTINUED

CHEMISTRY, OXYGEN, IONIZATION, ION DENSITY, COMPUTER APPLICATIONS, DIGITAL SIMULATION, CONVECTION, ELECTRIC FIELDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 385 7/3 19/1

UNITED TECHNOLOGIES CHEMICAL SYSTEMS SAN JOSE CA

'(U) High Energy Molecules of High Symmetry.

DESCRIPTIVE NOTE: Final rept. Mar 85-Feb 87,

AUG 87 71P

PERSONAL AUTHORS: Guimont, J. M.; Anderson, W. S.

CONTRACT NO. F049620-85-C-0056

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1009

UNCLASSIFIED REPORT

ABSTRACT: (U) The first phase of this program was investigation of triquinoyl hydrate (hexaketocyclohexane octahydrate, C6H16O14) which is formed when certain cyclohexane derivatives are treated with cold nitric acid. This ketone hydrate has now been characterized by measurements of its elemental composition, x-ray diffraction pattern, density, infrared and Raman spectrum, carbon thirteen NMP pattern, ultraviolet absorption and fluorescence spectra, ion chromatogram, potentiometric titration curve, solubility, rate of weight loss at several temperatures, heat of decomposition and of combustion, and reactivity toward several different nucleophiles, reducing agents and oxidizing agents. The ketone hydrate is an unusually dense, tightly hydrogen-bonded, acidic, crystalline material which in solution rapidly undergoes dehydration, disproportionation and ring-opening reactions. It may be regarded as a graphite oxide (graphitic acid) having the maximum oxygen-to-carbon ratio.

DESCRIPTORS: (U) *AZINES, *ENERGETIC PROPERTIES, HYDRATES, CYCLOHEXANES, KETONES, CHEMICAL COMPOSITION, LIGHT SCATTERING, RAMAN SPECTRA, INFRARED SPECTRA, FLUORESCENCE, POTENTIOMETRIC ANALYSIS, CHROMATOGRAPHS, EXPLOSIVES, OXIDATION, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) *Hydrate/Triquinoyl, Azine/Tetranitrodi,

AD-A185 385

AD-A185 385 CONTINUED

Hydrate/Hexaketocyclohexane octa, Azine/2,6-Diaminao-3,5-Dinetro-1,4-DI, Azine/Diaminodinitrodi, PE61102F, WUAFOSR2303B2.

AD-A185 385

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 369 20/4 12/3

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

(U) Conditional Second Order Closure for Turbulent Shear Flows.

DESCRIPTIVE NOTE: Final rept. Jul 84-Jun 87,

AUG 87 59P

PERSONAL AUTHORS: Kollman, W.

CONTRACT NO. $AFOSR-84-0219

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-0992

UNCLASSIFIED REPORT

ABSTRACT: (U) Second order turbulence closure models for conditional moments and the intermittency factor were developed. Methods for the treatment of turbulent/non-turbulent and other scalar interfaces were applied to the plane mixing layer and round jet. Multiscale closure models based on the dissipation rate were developed and applied to homogeneous turbulence and the plane jet. Scalar transport was investigated using the separation probability of clusters of particles and numerical solutions based on stochastic simulation techniques. A direct extension of conditional closure to velocity-scalar pdf equations was also developed.

DESCRIPTORS: (U) *TURBULENT FLOW, FLOW FIELDS, JET FLOW, MATHEMATICAL MODELS, PARTIAL DIFFERENTIAL EQUATIONS, CLOSURES, AXISYMMETRIC, DIFFUSION, VARIABLES, STOCHASTIC PROCESSES, PROBABILITY DENSITY FUNCTIONS, DIFFUSIVITY, MOMENTUM, TRANSPORT PROPERTIES, INTERFACES.

IDENTIFIERS: (U) Shearflow, Conditional closure, Intermittency factor, Transport equations, Vorticity, Scalar diffusion, WUAFOSR2307A2, PE61102F.

AD-A185 369

AD-A185 368 20/11 22/2

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Modeling and Control of Large Flexible Vehicles in the Atmosphere and Space.

DESCRIPTIVE NOTE: Final rept. 15 Dec 81-14 Dec 86,

JUN 87 8P

PERSONAL AUTHORS: Ashley, Holt

CONTRACT NO. $AFOSR-82-0062

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-87-1171

UNCLASSIFIED REPORT

ABSTRACT: (U) Summary of major research findings in three topical areas: 1) traveling wave concepts in the dynamics and control of Large Space Structures, 2) passive damping in Large Space Structures Applications, and 3) active control of rigid and flexible Manipulator Arms. The traveling wave concepts for characterizing the dynamics of flexible structures have introduced an alternative to modal synthesis and established a basis for the development of new controls algorithms. Passive damping studies identified various types of damping mechanisms including thermoelastic, and electromagnetic, and quantified their relative contributions. The active control studies generated a number of algorithms and control strategies and demonstration applications.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *EXTENDABLE STRUCTURES, *VIBRATION ISOLATORS, *ARTIFICIAL SATELLITES, CONTROL SYSTEMS, TRAVELING WAVES, DAMPING, MANIPULATORS, SPACE SYSTEMS.

IDENTIFIERS: (U) Active control, Passive damping, Large space structures, WUAFOSR2302B1, PE61102F.

AD-A185 368

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 366 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Freidlin-Wentzell Type Estimates and the Law of the Iterated Logarithm for a Class of Stochastic Processes Related to Symmetric Statistics.

DESCRIPTIVE NOTE: Rept. for Sep 86-Sep 87,

MAY 87 13P

PERSONAL AUTHORS: Mori, Toshio; Oodaira, Hiroshi

REPORT NO. TR-184

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1106

UNCLASSIFIED REPORT

ABSTRACT: (U) Analogues of Freidlin and Wentzell's estimates for diffusion processes and the functional law of the iterated logarithm are obtained for a class of stochastic processes represented by multiple Wiener integrals with respect to two parameter Wiener processes, which arise as the limit processes of sequences of normalized symmetric statistics. (Author)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *NORMALIZING(STATISTICS), LOGARITHM FUNCTIONS, ESTIMATES, DIFFUSION, PARAMETERS, ITERATIONS, INTEGRALS.

IDENTIFIERS: (U) PE61102F, WUAFOJR871106.

AD-A185 347 12/6 20/4

ALABAMA UNIV IN BIRMINGHAM DEPT OF MATHEMATICS

(U) Displaying Three-Dimensional Data.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-30 Jun 84,

87 2P

PERSONAL AUTHORS: Korbly, Letitia; O'Neil, Peter V.

CONTRACT NO. $AFOSR-83-0247

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1190

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the project was to graphically represent data obtained in the course of solving equations of fluid dynamics. Studies of three-dimensional data were done with data arising from a fluid dynamics problem involving high temperatures and velocities. Three representational methods were used: (1) particle tracings showing vectors pointing in the direction of flow at a point, 2) representation of contours, and 3) ray tracing, with color values assigned to a cell depending on the values of some quantity such as density.

DESCRIPTORS: (U) *DATA DISPLAYS, *FLUID DYNAMICS, THREE DIMENSIONAL, HIGH TEMPERATURE, PROBLEM SOLVING, VELOCITY, CONTOURS, RAY TRACING.

IDENTIFIERS: (U) RAVEN computer program, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY

AD-A185 346 12/1

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF AEROSPACE ENGINEERING

(U) A Synopsis of Elliptic PDE (Partial-Differential-Equation) Models for Grid Generation,

87 18P

PERSONAL AUTHORS: Warsi, Z. U.

CONTRACT NO. $AFOSR-85-0143

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1055

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Mathematics and Computation, v21 p295-311 1987.

ABSTRACT: (U) This paper is devoted to an analytical comparison of the various elliptic partial-differential-equation (PDE) models which are in current use for grid generation. These comparisons, particularly between the equations from the Laplace-Poisson system and the equations from a Gaussian approach, have yielded useful expressions connecting the 3D Laplacians and the surface Beltramians. This effort has specifically been successful when the transverse coordinate leaving the surface is orthogonal to the surface. Equations which are derivable from Cartesian-type Poisson equations and those obtained by using the variational principle in surface coordinates have also been considered. (Author)

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *NUMERICAL ANALYSIS, MATHEMATICAL MODELS, ELLIPSES, ORTHOGONALITY, GRIDS(COORDINATES), REPRINTS, FLUID DYNAMICS, COMPUTATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A185 346

SEARCH CONTROL NO. EVJ50D

AD-A185 345 12/3

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Stochastic Teams with Nonclassical Information Revisited: When is an Affine Law Optimal?

JUN 87 7P

PERSONAL AUTHORS: Bansal, Rajesh; Basar, Tamer

CONTRACT NO. $AFOSR-84-0056

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1137

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n6 p554-559 Jun 87.

ABSTRACT: (U) This document considers a parameterized family of two-stage stochastic control problems with nonclassical information patterns, which includes the well-known 1968 counterexample of Witsenhausen. It is shown that whenever the performance index does not contain a product term between the decision variables, the optimal solution is linear in the observation variables. The parameter space can be partitioned into two regions in one of which the optimal solution is linear, whereas in the other it is inherently nonlinear. Extensive computations using two-point piecewise constant policies and linear plus piecewise constant policies provide numerical evidence that nonlinear policies may indeed outperform linear policies when the product term is present. (Author)

DESCRIPTORS: (U) *STOCHASTIC CONTROL, *DECISION THEORY, PROBLEM SOLVING, OPTIMIZATION, LINEARITY, VARIABLES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A185 345

AD-A185 344 25/5 14/2 12/3

CLEMSON UNIV SC DEPT OF MATHEMATICAL SCIENCES

(U) Generating the Most Probable States of a Communication System,

APR 87 11P

PERSONAL AUTHORS: Valvo, E. J.; Shier, D. R.; Jamison, R. E.

CONTRACT NO. $AFOSR-84-0154

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1136

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of in IEEE INFOCOM '87, the Conference on Computer Communications, p1128-1136 2 Apr 87.

ABSTRACT: (U) This paper considers both theoretical and computational aspects of generating the most probable states of a communication system constructed of unreliable components. After identifying an underlying mathematical structure to the state space, an algorithm is developed for generating the states of the system in order of nonincreasing probability. Computational results with the algorithm show that it is reasonably efficient in practice.

DESCRIPTORS: (U) *COMMUNICATION EQUIPMENT, *RELIABILITY, *PROBABILITY, ALGORITHMS, REPRINTS.

IDENTIFIERS: (U) Partial order, Performance measures, State space, PE61102F, WUAFORSR2304A5.

AD-A185 344

AD-A185 342 20/5 7/5

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Quantitative Two-Photon LIF (Laser-Induced Fluorescence) Imaging of Carbon Monoxide in Combustion Gases,

JUL 87 10P

PERSONAL AUTHORS: Seitzman, Jerry M.; Haumann, Jurgen; Hanson, Ronald K.

CONTRACT NO. F49620-83-K-0004, $AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-0987

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Optics, v26 n14 p2892-2899, 15 Jul 87.

ABSTRACT: (U) Two-dimensional imaging of CO concentration in combustion gases is demonstrated using two-photon-excited planar laser-induced fluorescence. A quantitative model is presented for the simultaneous two-photon excitation of several rotational transitions of the B to A system and the subsequent visible fluorescence (F to A). The model is verified by comparison of predicted and measured excitation spectra and of temperature-corrected relative fluorescence measurements to standard probe measurements of the center line CO distribution in a CO-air diffusion flame. In addition, CO imaging experiments in a premixed methane-air flame indicate the production of C2 by laser photodissociation of acetylene.

DESCRIPTORS: (U) *TWO PHOTON ABSORPTION, *LASER INDUCED FLUORESCENCE, IMAGES, CARBON MONOXIDE, COMBUSTION PRODUCTS, ISOMERIC TRANSITIONS, ACETYLENE, REPRINTS.

IDENTIFIERS: (U) Rotational transitions, PE61102F, WUAFOSR2308A3.

AD-A185 342

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 341 12/2

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Qualitative Robustness in Time Series,

MAR 87 33P

PERSONAL AUTHORS: Papantoni-Kazakos, P.

CONTRACT NO. $AFOSR-87-0224

PROJECT NO. 2304

MONITOR: AFOSR TR-87-1040

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Information and Computation, v72 n3 p239-269 Mar 87.

ABSTRACT: (U) Consider robust operations in time series. A definition and subsequent qualitative analysis of robustness is presented. Meaningful definitions are presented of performance criteria, such as the breakdown point and the sensitivity of robust operations. Some specific classes of robust operations are presented and their properties, are discussed and analyzed. Finally, a particular class of robust predictors and interpolators was analyzed,for a linearly contaminated class of stationary stochastic processes discussed and analyzed.

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, *STOCHASTIC PROCESSES, QUANTIZATION, INTERPOLATION, LINEAR FILTERING.

IDENTIFIERS: (U) Robust procedures, Monotone functions, PE61102F.

AD-A185 340 12/2

ILLINOIS UNIV AT URBANA

(U) Some Results on Generalized Unimodality and an Application to Chebyshev's Inequality.

DESCRIPTIVE NOTE: Final rept. 1984-1985,

86 8P

PERSONAL AUTHORS: Dharmadhikari, S. W.; Joag-Dev, Kumar

CONTRACT NO. $AFOSR-84-0208

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-87-1038

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Reliability and Quality Control, p127-132 1986.

ABSTRACT: (U) The concept of generalized unimodality is used to improve a bivariate Chebyshev-type inequality.

DESCRIPTORS: (U) *INEQUALITIES, *BIVARIATE ANALYSIS, CHEBYSHEV FUNCTIONS, DISCRETE DISTRIBUTION, MARKOV PROCESSES, REPRINTS.

IDENTIFIERS: (U) Unimodality, PE61102F, WUAFOSR2304K3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 339 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Synthesis and X-Ray Structure of Cis-1,3-Di-Tert-Butyl-2,4-Bis(Pentafluoropnenoxy)-' 3,2,4-Diazadiphosphetidine.

DESCRIPTIVE NOTE: Journal article,

87 4P

PERSONAL AUTHORS: Kamil, W. A.; Bond, Marcus R.; Shreeve, Jeanne M.

CONTRACT NO. $AFOSR-82-0247

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1183

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v26 p2015-2016 1987.

ABSTRACT: (U) Lithium penetafluorophenoxide was reacted with cis-1,3-di-tert-butyl-2,4-dichloro-1,3,2,4-diazaphosphetidine in a mixture of diethyl ether and hexane at -78 C to form cis-1,3-di-tert-butyl-2,4-bis(pentafluorophenoxy)-1,3,2,4-diazaphosphetidine. An X-ray crystal structure determination confirmed the existence of the cis isomer.

DESCRIPTORS: (U) *ORGANIC PHOSPHORUS COMPOUNDS, LITHIUM COMPOUNDS, FLUORINE COMPOUNDS, PHENYL RADICALS, X RAY SPECTRA, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A185 338 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Some New Highly Substituted Trifluoromethyl Sulfuranes.

DESCRIPTIVE NOTE: Journal article,

87 9P

PERSONAL AUTHORS: Gupta, Krishna D.; Shreeve, Jeanne M.

CONTRACT NO. $AFOSR-82-0247

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1181

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v34 p453-460 1987.

ABSTRACT: (U) Trans-Chlorotetrafluoro(trifluoromethyl) sulfur(VI), CF3SF4C1, readily undergoes reductive defluorination to sulfur (IV)-containing compounds when it is reacted with nitrogen- or oxygen-containing nucleophiles. Thus, CF3S(NR2)2C1 results from a variety of nitrogen bases, such as R2NH = piperidine, 2,6-dimenthylpiperidine, 2,2,6,6-tetra-methylpiperdine, morpholine, 3,5-dimethylmorpholine, and N,N'-dimethylethenediamine. With alcohols, CF3S(ORf)2C1 is formed where RFOH = 2,2,2-trifluoroethanol and 1,1,1-trifluoro-2-propanol. Due to the low stability of all of these compounds, complete characterization was difficult.

DESCRIPTORS: (U) *CHLORINE COMPOUNDS, FLUORINE COMPOUNDS, METHYL RADICALS, SULFUR COMPOUNDS, CHEMICAL REACTIONS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 322 7/4

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

(U) Positively Invariant Regions for a Problem in Phase Transitions,

86 20P

PERSONAL AUTHORS: Roytburd, V.; Slemrod, M.

CONTRACT NO. $AFOSR-81-0172, $NSF-DMS84-08260

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1052

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Archives for Rational Mechanics and Analysis, v93 n1 p61-79 1986.

ABSTRACT: (U) Positively invariant regions for the system sub t + p(w) sub x = epsilon sub xx w sub t - v sub x = ew sub xx are constructed where p' <), w< alpha, w>beta, P'(w) = 0, alpha < or = w < or = beta, e > 0. Such a choice of p is motivated by the Maxwell construction for a van der Waals fluid. The method of an analysis is a modification of earlier ideas . The results given here provide epsilon independent L at infinity bounds on the solution (w,v).

DESCRIPTORS: (U) *PHASE TRANSFORMATIONS, EQUATIONS OF STATE, REPRINTS.

IDENTIFIERS: (U) Van Der Walls fluids, PE61102F, WUAFOSR2304A1.

AD-A185 320 12/1

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) New Results on Pole-Shifting for Parametrized Families of Systems,

86 19P

PERSONAL AUTHORS: Hautus, M. L. J.; Sontag, Eduardo D.

CONTRACT NO. $AFOSR-85-0247

MONITOR: AFOSR
TR-87-1220

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Pure and Applied Algebra, v40 p229-244 1986.

ABSTRACT: (U) New results are given on the pole-shifting problem for commutative rings, and these are then applied to conclude that rings of continuous, smooth, or real-analytic functions on a manifold X are PA rings if and only if X is one-dimensional. This paper establishes new results regarding control problems for parametrized families of pairs('systems').

DESCRIPTORS: (U) *RINGS(MATHEMATICS), CONTROL THEORY, PROBLEM SOLVING, ONE DIMENSIONAL, PARAMETERS, REPRINTS.

IDENTIFIERS: (U) *Commutative rings.

AD-A185 322 AD-A185 320

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 319 12/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Continuous Stabilizers and High-Gain Feedback,

86 18P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. $AFOSR-85-0247

MONITOR: AFOSR TR-87-1221

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IMA Jnl. of Mathematical Control and Information, v3 p237-253 1986.

ABSTRACT: (U) A controller is shown to exist, universal for the family of all systems of fixed dimension n with m controls, which stabilizes those systems that are stabilizable whenever certain gains are large enough. The controller parameters are polynomial functions of the entries of the plant. As a consequence, a result is proved on polynomial stabilization of families of systems. (Author)

DESCRIPTORS: (U) *CONTROL THEORY, HIGH GAIN, FEEDBACK, STABILIZATION, PARAMETERS, POLYNOMIALS, REPRINTS.

IDENTIFIERS: (U) *CONTINUOUS STABILIZERS.

AD-A185 318 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Remarks on the Foundations of Measures of Dependence.

DESCRIPTIVE NOTE: Technical rept.,

87 10P

PERSONAL AUTHORS: Bradley, Richard C.; Bryc, Wlodzimierz; Janson, Svante

REPORT NO. TR-105

CONTRACT NO. F49620-82-C-0009, F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1139

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in New Perspectives in Theoretical and Applied Statistics, p421-437 1987.

ABSTRACT: (U) Comparisons between measures of dependence are studied. Special emphasis is given to measures of dependence based on B-valued (and in particular H-valued) random variables and their connection to the absolute regularity conditions for stochastic processes. (Author)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, RANDOM VARIABLES, BANACH SPACE, COVARIANCE, COMPARISON, REPRINTS.

IDENTIFIERS: (U) *Dependence(Mathematics), PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 315 12/2

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Fast Algorithms for Non-Hermitian Quasi-Toeplitz Matrices,

MAY 87 5P

PERSONAL AUTHORS: Bistritz, Yuval; Kailath, Thomas

CONTRACT NO. N00014-85-K-0612, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-87-1057

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in International* Symposium on Circuits and Systems, p1068-1071 May 87.

ABSTRACT: (U) The classical algorithms of Schur and Levinson are efficient procedures to obtain the triangular factorization of, respectively, a Hermitian Toeplitz matri< and its inverse. Extensions of the Schur algorithms to Hermitian Quasi-Toeplitz (Q-T) matrices (matrices with certain hidden Toeplitz structure) and the Levinson algorithm to admissable (a sub-class of) Q-T matrices are also known. This paper extends these Schur and Levinson algorithms to non-Hermitian Q- T matrices. The fast algorithms for non-Hermitian Q-T matrices are shown to be associated with two discrete transmission lines which reduce to the familiar single lattice in the Hermitian case.

DESCRIPTORS: (U) *MATRICES(MATHEMATICS), ALGORITHMS, SOLUTIONS(GENERAL), LINEAR ALGEBRA, CIRCUIT ANALYSIS, MATHEMATICAL FILTERS, RECURSIVE FUNCTIONS, REPRINTS.

IDENTIFIERS: (U) Toeplitz matrices, Schur algorithm, Levinson algorithm, PE61102F, WUAFOSR2304A6.

AD-A185 314 20/4

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Quantitative Imaging of Temperature Fields in Air Using Planar Laser-Induced Fluorescence of 02,

FEB 87 5P

PERSONAL AUTHORS: Lee, Michael P.; Paul, Phillip H.; Hanson, Ronald K.

CONTRACT NO. F49620-83-K-0004, $AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-0988

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Optics* Letters, v12 n2 p75-77 Feb 87.

ABSTRACT: (U) Planar laser-induced fluorescence of 02 has been used to acquire quantitative, instantaneous two-dimensional images of temperature in heated air flows. 02 is excited by using a broadband ArF excimer laser at 193 nm, and the resultant fluorescence signal is converted to temperature by using a theoretical calculation of the dependence of the fluorescence on temperature. This calculation has been confirmed experimentally, and validating data are presented.

DESCRIPTORS: (U) *AIR FLOW, OXYGEN, LASER INDUCED FLUORESCENCE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 313 12/3

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) A Fast Transversal Filter for Adaptive Line Enhancement,

87 5P

PERSONAL AUTHORS: Slock, D. T.; Cioffi, J. M.; Kailath, T.

CONTRACT NO. DAAG29-85-K-0048, $AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-87-1056

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Conference on Acoustic and Signal Processing, p419-422 1987.

ABSTRACT: (U) The important problem of Adaptive Line Enhancing (ALE) is addressed in this paper. Its solution involves an Adaptive Notch Filter (ANF) proposed in references using a minimal parameter constrained infinite impulse response (IIR) model in conjunction with the Recursive Prediction Error Method (RPEM). A Fast Transversal Filter (FTF) algorithm for the adaptive RLS-type updating of the linear phase filter is presented. (Author)

DESCRIPTORS: (U) *ADAPTIVE FILTERS, *PROCESSING EQUIPMENT, *SIGNAL PROCESSING, OPTIMIZATION, PULSES, MOMENTUM, ALGORITHMS, ERRORS, REPRINTS.

IDENTIFIERS: (U) ALE(Adaptive LWE Enhancing), Fast filters, ANF(Adaptive Notch Filters), Notch filters, IIR(Infinite Impulse Response), Weighting, FTF(Fast Transversal Filters), Line processing, Damping, Prefilters, Phase filters, PE61102F, WUFAFOSR2304A6.

AD-A185 307 12/3

KING SAUD UNIV RIYADH (SAUDI ARABIA) DEPT OF STATISTICS

(U) Closure of the NBUE (New Better than Used in Expectation) and DMRL (Decreasing Mean Residual Life) Classes under Formation of Parallel Systems,

AUG 86 4P

PERSONAL AUTHORS: Abouammoh, A.; El-Neweihi, E.

CONTRACT NO. $AFOSR-80-0170

MONITOR: AFOSR
TR-87-1222

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Statistics and Probability Letters, v4 n5 p223-225 1986.

ABSTRACT: (U) The class of new better than used in expectation life distributions is shown to be closed under the formation of parallel systems with independent and identically distributed components. The class of differentiable life distributions with decreasing mean residual life is also proved to have the same closure property.

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, RANDOM VARIABLES, RESIDUALS, REPRINTS.

IDENTIFIERS: (U) *Life distributions, Parallel systems.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 305 12/3

COLUMBIA UNIV NEW YORK DEPT OF STATISTICS

(U) Equivalent Models for Finite-Fuel Stochastic Control.

DESCRIPTIVE NOTE: Rept. for 1 Aug 86-31 Jul 87,

86 33P

PERSONAL AUTHORS. Karatzas, Ioannis; Shreve, Steven E.

CONTRACT NO. $AFOSR-86-0203, $AFOSR-85-0343

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1054

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic, v18 p245-276 1986.

ABSTRACT: (U) This project has initiated an ongoing study of singular stochastic control problems of the finite-fuel type, and their relations to questions of optimal stopping. These problems are studied here mainly by analytical techniques; they lead to explicitly solvable free boundary problems, and to simpler questions in stochastic optimization, such as families of optimal stopping problems, and singular control with unlimited fuel.

DESCRIPTORS: (U) *STOCHASTIC CONTROL, STOCHASTIC PROCESSES, FUELS, MATHEMATICAL MODELS, REPRINTS.

IDENTIFIERS (U) PE61102F, WUAFOSR2304A1.

AD-A185 305

AD-A185 304 17/11

HARRIS CORP MELBOURNE FL

(U) Optimal Output Feedback for Nonzero Set Point Regulation.

DESCRIPTIVE NOTE: Journal article,

JUL 87 6P

PERSONAL AUTHORS: Bernstein, Dennis S.; Haddad, Wassim M.

CONTRACT NO. F49620-86-C-0002, $AFOSR-86-0002

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1026

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n7 p641-645 Jul 87.

ABSTRACT: (U) Motivated by the results on steady-state periodic tracking, a continuous-time nonzero set point regulation problem is considered which involves 1) noisy and nonnoisy measurements, 2) weighted and unweighted controls, 3) correlated plant/measurement noise and cross weighting, 4) nonzero-mean disturbances, and 5) state-, control-, and measurement-dependent white noise. It is shown that in the absence of multiplicative disturbances the closed-loop control can be designed independently of the open-loop control. The results are obtained without using the overtaking criterion.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *TRACKING, CORRELATION TECHNIQUES, WEIGHTING FUNCTIONS, WHITE NOISE, COMPARISON, CLOSED LOOP SYSTEMS, OPEN LOOP SYSTEMS, RICCATI EQUATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A185 304

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 303 12/3

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) The Optimal Projection Equations for Reduced-Order, Discrete-Time State Estimation for Linear Systems with Multiplicative White Noise.

DESCRIPTIVE NOTE: Journal article,

87 9P

PERSONAL AUTHORS: Haddad, Wassim M.; Bernstein, Dennis S.

CONTRACT NO. F49620-86-C-0002, $AFOSR-86-0002

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1058

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters, v8 p381-388 1987.

ABSTRACT: (U) The optimal projection equations obtained for reduced-order, discrete-time state estimation are generalized to include the effects of state- and measurement-dependent noise to provide a model of parameter uncertainty. In contrast to the single matrix Riccati equation arising in the full-order (Kalman filter) case, the optimal steady-state reduced-order discrete-time estimator is characterized by three matrix equations (one modified Riccati equation and two modified Lyapunov equations) coupled by both an oblique projection and stochastic effects.

DESCRIPTORS: (U) *CONTROL THEORY, *STOCHASTIC CONTROL, KALMAN FILTERING, LYAPUNOV FUNCTIONS, RICCATI EQUATION, WHITE NOISE, OPTIMIZATION, MATRICES(MATHEMATICS), DISCRETE DISTRIBUTION, REPRINTS.

IDENTIFIERS: (U) UNCERTAINTY, PE61102F, WUAFOSR2304A1.

AD-A185 303

AD-A185 286 12/9

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G

(U) Multi-Disciplinary Techniques for Understanding Time-Varying Space-Based Imagery.

DESCRIPTIVE NOTE: Final rept. May 84-May 85,

MAY 85 133P

PERSONAL AUTHORS: Casasent, David; Sanderson, Arthur; Kanade, Takeo

CONTRACT NO. F49620-83-C-0100, $AFOSR-79-0091

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-87-1028

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is intended to combine: pattern recognition, image understanding and artificial intelligence techniques for space-based image processing as well as: optical and digital processing methods. Optical feature extraction and sub-pixel target detection and tracking results are summarized. Scene representation and modeling work using: probabilistic graph matching, multiple resolution rotation-invariant operators and texture analysis are detailed. Image understanding techniques for 3D scene interpretation discussed include 2D image-level methods (using features such as edges, lines and corners) and 3D scene-level methods. New dynamic programming, stereo image and model building results are included.

DESCRIPTORS: (U) *IMAGE PROCESSING, PATTERN RECOGNITION, ARTIFICIAL INTELLIGENCE, OPTICAL IMAGES, DIGITAL SYSTEMS, TRACKING, TARGET DETECTION, TEXTURE, DYNAMIC PROGRAMMING, IMAGE REGISTRATION.

IDENTIFIERS: (U) Pixels(Picture elements), Scene analyses, Feature extraction, Texture analysis, PE61102F, WUAFOSR2304A7.

AD-A185 286

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 285 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTE MS ANALYSIS

(U) A Monte Carlo Sampling Plan for Estimating Reliability Parameters and Related Functions,

87 20P

PERSONAL AUTHORS: Fishman, George S.

CONTRACT NO. $AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1062

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Networks, v17 p169-186 1987.

ABSTRACT: (U) The author considers an undirected network G with node set V and arc set E = (1,...,n) where arcs fail randomly and independently. Let T be a subset of V and let M sub k denote the number of ways that all the nodes of T are connected (T-connectivity) with exactly k operating arcs and n - k failed arcs. This paper describes a sampling plan for estimating (M sub k) and linear functions of these parameters, including the T-connectedness reliability function g(p) for common failure probability 1 - p.

DESCRIPTORS: (U) *MONTE CARLO METHOD, *STATISTICAL SAMPLES, INTERVALS, PROBABILITY DISTRIBUTION FUNCTIONS, ESTIMATES, CONFIDENCE LIMITS, RELIABILITY, PARAMETERS, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A185 285

AD-A185 284 21/2 7/4

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) LIF (Laser Induced Fluorescence) Study of CH A 2Delta Collision Dynamics in a Low Pressure Oxy-Acetylene Flame.

DESCRIPTIVE NOTE: Journal article,

87 6P

PERSONAL AUTHORS: Joklik, R. G.; Daily, J. W.

CONTRACT NO. $AFOSR-86-0067, $AFOSR-81-0222

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-0989

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combustion and Flame, v69 p211-219 1987.

ABSTRACT: (U) Steady-state linear laser induced fluorescence (LIF) has been used to investigate internal energy redistribution rates in A2 delta v' = 0 CH in a low pressure oxy-acetylene flame. By obtaining rotationally resolved spectra as a function of pressure the branching ratio, defined as the ratio of rotational transfer (R) out of the laser excited state divided by the electronic quenching rate (Q), was measured for a variety of flame conditions. For a stoichiometric 1600K flame and K' = 6 excitation R/Q = 3.6 + or - 0.5. The branching ratio was also found to increase with K' and decrease with equivalence ratio. In addition, for K' = 6 excitation, a value of the electronic quenching cross section of 5.4 + or - 3.6 A2 was obtained.

DESCRIPTORS: (U) *FLAMES, OXYGEN, ACETYLENE, LOW PRESSURE, LASER INDUCED FLUORESCENCE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A185 284

AD-A185 281 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Ergodic Properties of Stationary Stable Processes.

DESCRIPTIVE NOTE: Rept. for Sep 86-Sep 87,

87 19P

PERSONAL AUTHORS: Cambanis, Stamatis; Hardin, Clyde D., Jr.; Weron, Aleksander

REPORT NO. TR-59

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1035

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic Processes and Their Applications, v24 p1-18 1987.

ABSTRACT: (U) Spectral necessary and sufficient conditions are derived for stationary symmetric stable processes to be metrically transitive and mixing. Then consider some important classes of stationary stable processes: Sub-Gaussian stationary processes and stationary stable processes with a harmonic spectral representation are never metrically transitive, the latter in sharp contrast with the Gaussian case. Stable processes with a harmonic spectral representation satisfy a strong law of large numbers even though they are not generally stationary. For doubly stationary stable processes, sufficient conditions are derived for metric transitivity and mixing, and necessary and sufficient conditions for a strong law of large numbers.

DESCRIPTORS: (U) *ERGODIC PROCESSES, SPECTRUM ANALYSIS, GAUSSIAN QUADRATURE, FOURIER TRANSFORMATION, REPRINTS.

IDENTIFIERS: (U) Stationary processes, Stable processes, PE61102F, WUAFOSR2304A5.

AD-A185 281

AD-A185 277 12/4

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Recent Discoveries on Optimal Designs for Comparing Test Treatments with Controls.

DESCRIPTIVE NOTE: Technical rept.,

MAR 87 31P

PERSONAL AUTHORS: Hedayat, A. S.; Jacroux, Mike; Majumdar, Dibyen

REPORT NO. TR-87-03

CONTRACT NO. $AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1042

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Washington State Univ.

ABSTRACT: (U) The authors introduce the problem with an example. How should we design an experiment to compare 4 test treatments with a control, using 18 experimental units? As a statistical question we will not be able to answer it unless it is asked in a more precise manner. To begin with we need to postulate a model for the response observed upon application of a treatment, test treatment or control, to an experimental unit. This paper shall consider three possible models: 1) 0-way elimination of heterogeneity model in which all experimental units are homogeneous before application of treatments; 2) 1-way elimination of heterogeneity model in which experimental units can be divided into several homogeneous blocks; and 3) 2-way elimination of heterogeneity model in which the experimental units can be conceptually arranged according to rows and columns.

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, MATHEMATICAL MODELS, OPTIMIZATION, HETEROGENEITY, HOMOGENEITY, CONTROL.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 277 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A185 275 12/1

INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

(U) Costs of Quadtree Representation of Non-dense Matrices.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 87,

AUG 87 28P

PERSONAL AUTHORS: Wise, David S.; Franco, John

CONTRACT NO. $AFOSR-84-0372, $NSF-DCR84-05241

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-87-1168

UNCLASSIFIED REPORT

ABSTRACT: (U) Quadtree representation of matrices offers a homogeneous representation for both sparse and dense matrices, with advantages for processing on multiprocessors. This paper offers exact values for the average depth and on the number of nodes in this representation of some familiar patterned matrices: symmetric, triangular, and banded. It similarly measures three permutation matrices as comparative examples of non-dense, unpatterned matrices. Those results are exact values for the shuffle and bit-reversal permutations raised by the fast Fourier transform, as well as tight bounds on the expected values from purely random permutations. Two different measures for density and for sparsity are proposed from these values, and a simple analysis of quadtree matrix addition is given as an illustration of these measures. (Author)

DESCRIPTORS: (U) *SPARSE MATRIX, MULTIPROCESSORS, DENSITY, NODES, LINEAR ALGEBRA, PERMUTATIONS, FAST FOURIER TRANSFORMS, ALGORITHMS, SYMMETRY.

IDENTIFIERS: (U) WUAFOSR2304A2, PE61102F.

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AD-A185 275

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 192 7/3

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Formation of the Novel Benezophenone Sila-acylhydrazonato Complex (Eta5-C5Me5)Cl3Ta(OC(SiMe3) NNCPh2) Following Addition of Diphenyldiazomethane to an Eta2-Sila-acyl Ligand.

87 5P

PERSONAL AUTHORS: Arnold, John; Tilley, T. D.; Rheingold, Arnold L.; Geib, Steven J.

CONTRACT NO. $AFOSR-85-0228

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1338

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl of the Chemical Society, Chemical Communications, p793-794 1987.

ABSTRACT: (U) The N2-sila-acyl complex cp*C13Ta(N2-COSiMe3) (CP=n5-C5Me5) (1) reacts rapidly with diphenyldiazomethane to form cp*C13Ta(OC(SiMe3)NNCPh2) (2) , the first characterized product of reaction between an N2-acyl compound and a diazoalkane.

DESCRIPTORS: (U) *SILANES, DIAZO COMPOUNDS, METHANES, PHENYL RADICALS, CHEMICAL REACTIONS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A185 191 20/4

HOUSTON UNIV TEX DEPT OF MATHEMATICS

(U) Equivalence of the Euler and Lagrangian Equations of Gas Dynamics for Weak Solutions.

JUN 87 20P

PERSONAL AUTHORS: Wagner, David H.

CONTRACT NO. $AFOSR-86-0218, $NSF-DMS86-01917

MONITOR: AFOSR TR-87-1333

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Differential Equations, v68 n1 p118-136, 15 Jun 87.

ABSTRACT: (U) This paper demonstrates the equivalence of the Euler and the Lagrangian equations of gas dynamics in one space dimension for weak solutions which are bounded and measurable in Eulerian coordinates. The precise hypotheses include all known global solutions on R x R +. In particular, solutions containing vacuum states (zero mass density) are included. Furthermore, there is a one-to-one corresponding admissibility criteria are equivalent. In the presence of a vacuum, the definition of weak solution for the Lagrangian equations must be strenghtened to admit test functions which are discontinuous at the vacuum. As an application, we translate a large-date existence result of DiPerna for the Euler equations for isentropic gas dynamics into a similar theorem for the Lagrantian equations.

DESCRIPTORS: (U) GAS DYNAMICS, *LAGRANGIAN FUNCTIONS, EULER ANGLES, SOLUTIONS(GENERAL), ISENTROPE, REPRINTS.

IDENTIFIERS: (U) *Eulerian functions, Weak solutions, Equivalence, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 133 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Final Report on Contract F49620-85-C-0026. Volume 5.

DESCRIPTIVE NOTE: Rept. for 1 Oct 84-30 Nov 86,

MAY 87 31P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-85-C-0026

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1349-VOL-5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A185 129.

ABSTRACT: (U) Contents: Secondary instability of free shear flows, positive and negative effective viscosity phenomena in isotropic and anisotropic beltrami flows.

DESCRIPTORS: (U) *TURBULENCE, *DIGITAL SIMULATION, SHEAR STRESSES, VORTICES, NAVIER STOKES EQUATIONS, TWO DIMENSIONAL FLOW, REYNOLDS NUMBER.

IDENTIFIERS: (U) Mixing layers, Beltrami flow, WUAFOSR2307A2, PE61102F.

AD-A185 133

AD-A185 132 20/4 12/1

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Final Report on Contract F49620-85-C-0026. Volume 4.

DESCRIPTIVE NOTE: Rept. for 1 Oct 84-30 Nov 86,

MAY 87 67P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-85-C-0026

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1349-VOL-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 5, AD-A185 133.

ABSTRACT: (U) Contents: Weak interactions and local order in strong turbulence; relation between the Kolmogorov and batchelor constants; an efficient method or computing leading eigenvalues and eigenvectors of large asymmetric matrices.

DESCRIPTORS: (U) *TURBULENCE, *DIGITAL SIMULATION, CHANNEL FLOW, DECAY SCHEMES, LINEAR ALGEBRA, MATRICES(MATHEMATICS), EIGENVECTORS, EIGENVALUES, COMPUTATIONS, ASYMMETRY, GROUPS(MATHEMATICS), EDDIES(FLUID MECHANICS).

IDENTIFIERS: (U) Kolmogorov constant, Batchelor constant, Weak interactions, Renormalization, WUAFOSR2307A2, PE61102F.

AD-A185 132

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 131 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Final Report on Contract F49620-85-C-0026. Volume 3.

DESCRIPTIVE NOTE: Rept. for 1 Oct 84-30 Nov 86,

MAY 87 30P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-85-C-0026

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1349-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 4, AD-A185 132.

ABSTRACT: (U) Contents: Secondary instability of a temporally growing mixing layer.

DESCRIPTORS: (U) *TURBULENCE, DIGITAL SIMULATION, NAVIER STOKES EQUATIONS, SIMULATION, INVISCID FLOW, STABILITY, SHEAR PROPERTIES, POISSON EQUATION.

IDENTIFIERS: (U) Mixing layer, WUAFOSR2307A2, PE61102F.

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AD-A185 130 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Final Report on Contract F49620-85-C-0026. Volume 2.

DESCRIPTIVE NOTE: Rept. for 1 Oct 84-30 Nov 86,

MAY 87 53P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-85-C-0026

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1349-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A185 131.

ABSTRACT: (U) Contents: Renormalization - Group analysis of turbulence: Heat transfer in turbulent fluids - 1. Pipe flow: numerical simulation of turbulent spots in channel and boundary layer flows.

DESCRIPTORS: (U) *TURBULENCE, *DIGITAL SIMULATION, CHANNEL FLOW, BOUNDARY LAYER FLOW, HEAT TRANSFER, PRANDTL NUMBER, PIPES, GROUPS(MATHEMATICS).

IDENTIFIERS: (U) Pipe flow, Renormalization, Kolmogorov constant, WUAFOSR2307A2, PE61102F.

AD-A185 130

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A185 129 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Final Report on Contract F49620-85-C-0026. Volume 1.

DESCRIPTIVE NOTE: Rept. for 1 Oct 84-30 Nov 86,

MAY 87 48P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-85-C-0026

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1349-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A185 130.

ABSTRACT: (U) Contents: Analogy between Hyperscale Transport and Cellular Automaton Hydrodynamics; Secondary Instabilities, Coherent Structures and Turbulence, in Supercomputers and Fluid Dynamics; Reynolds Number Scaling of Cellular Automation Hydrodynamics; and Renormalization Group Analysis of Turbulence. I. Basic Theory.

DESCRIPTORS: (U) *TURBULENCE, *DIGITAL SIMULATION, EDDIES(FLUID MECHANICS), REYNOLDS NUMBER, SHEAR STRESSES, AUTOMATA, TRANSPORT PROPERTIES, SCALING FACTORS, GROUPS(MATHEMATICS), HYDRODYNAMICS.

IDENTIFIERS: (U) Cellular automata, WUAFOSR2307A2, PE61102F.

AD-A184 915 12/4

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) On Worst Case Design Strategies,

87

PERSONAL AUTHORS: Basar, Tamer; Kumar, Panganamala R.

CONTRACT NO. DAAG29-85-K-0094, $AFOSR-84-0056

MONITOR: ARO, AFOSR
22260.8-MA, TR-87-1122

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Computers and Mathematics with Applications, v13 n1-3 p239-245 1987. Sponsored in part by Grant NSF-ECS83-04435.

ABSTRACT: (U) For sequential decision processes, we consider the problem of obtaining the min-max strategy which minimizes the worst case performance. This is a game against nature, attempts to maximize it. It is apparently a folk theorem that such a min-max strategy can be obtained by means of a dynamic programming like recursion, even though we have not seen any general proof of this, applicable to stochastic systems, which does not rely on the existence of a saddle point. We prove this theorem and also examine the precise roles of the strategy sets allowed to the minimizer and the maximizer in determining the upper value of the game. improvements in the results for the case of deterministic systems and generalizations to continuous time systems are indicated.

DESCRIPTORS: (U) *MINIMAX TECHNIQUE, DYNAMIC PROGRAMMING, OPTIMIZATION, STOCHASTIC PROCESSES, CONTROL SYSTEMS, REPRINTS.

IDENTIFIERS: (U) Markov chains.

IAC NO.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ50D

AD-A184 576 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) A Note on a Renewal Theorem for a Moving Average Process.

DEC 86

PERSONAL AUTHORS: Yu,Kai F. ;

CONTRACT NO. MIPR-ARO-139-85, AFOSR-84-0156

MONITOR: ARO, AFOSR
21245.28-MA, TR-87-0998

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Bulletin of the Inst. of Mathematics Academica Sinica, v14 n4 p349-354 Dec 86.

ABSTRACT: (U) This document describes distributed random variables and then relationship to a moving average process.

DESCRIPTORS: (U) *DISTRIBUTION THEORY, *RANDOM VARIABLES, PROBABILITY, REPRINTS

IDENTIFIERS: (U) Renewal theorem, Moving average process

IAC NO.

AD-A184 576

AD-A184 256 12/4

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) A Heteroscedastic Hierarchical Model.

DESCRIPTIVE NOTE: Technical rept.,

APR 87

PERSONAL AUTHORS: Jewell,William S. ;

REPORT NO. ORC-87-11

CONTRACT NO. AFOSR-81-0122

PROJECT NO. 2304

MONITOR: AFOSR
TR-87-1072

UNCLASSIFIED REPORT

ABSTRACT: (U) Hierarchical models are important in Bayesian prediction because they enable the use of collateral data from related risks with exchangeable parameters. The classical normal-normal-normal model with random means show clearly how the linear predictive mean for a single risk is improved by the availability of cohort data. However, this model has the disadvantage that the predictive density is homoscedastic, that is, the posterior, variance depends only on the design (number of risks and number of samples). In most applications, one would assume that the variance also depended upon the data values. One can, of course, change the variances at each level into random parameters, but this modifies the predictive mean formulae and leads to messy results in general. In the course of examining approximations to r predictive variances, the author has found an extended normal model with variances that are quadratic in the data, and with the additional advantage that the linear mean formulae are unchanged.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *MATHEMATICAL PREDICTION, BAYES, THEOREM, ANALYSIS OF VARIANCE, PARAMETERS, RISK, MEAN, COVARIANCE

IDENTIFIERS: (U) Heteroscedastic variances, PE61102F

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