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Air Force Systems Command

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TECHNICAL REPORT SUMMARIES

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AFOSR

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PREPARED BY:

BARBARA WERT, CHIEF

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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries are published quarterly as of March, June, September, and December of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. The summaries contain two indexes for easily locating the technical reports that may be of interest to the user. These are followed by abstracts of the reports.

1) SUBJECT INDEX

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- b. Title of Report
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PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

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The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of Scientific Research is supporting fundamental scientific research. The AFOSR is organizationally under the DCS/Science and Technology, Air Force Systems Command.

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Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

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Abstract - A brief summary describing the research of the report.

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ABSTRACTS

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AD-PO04 940 12/1 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

RENSELAER POLYTECHNIC INST TROY NY AD-C037 392L 4/2

(U) A Mesh Moving Technique for Time Dependent Partial Differential Equations in Two Space Dimensions, IRT CORP MCLEAN VA

FEB 85 23P (U) TEAL GRANITE.

PERSONAL AUTHORS: Arney, D. C.; Flaherty, J. E.; DESCRIPTIVE NOTE: Final rept. Oct 82-Jun 84,

CONTRACT NO. DAAG29-82-K-0197, AFOSR-80-0192 JUN 84 66P

MONITOR: AFOSR TR-85-0831 CONTRACT NO. F49620-83-C-0037, ARPA Order-4664

TASK NO. A7 PROJECT NO. 2301

MONITOR: AFOSR TR-85-0608

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Transactions of the Army Conference on Applied Mathematics and Computing (2nd) Held at Washington, DC on 22-25 May 1984,' AD-A154 047, p611-633.

ABSTRACT: (U) This article discusses an adaptive mesh moving technique that can be used with a finite difference or finite element scheme to solve initial-boundary value problems for vector systems of partial differential equations in two space dimensions and time. The mesh moving technique is based on an algebraic node movement function determined from the propagation of significant error regions. The algorithms is designed to be flexible, so that it can be used with many existing finite difference and finite element methods. To test the mesh moving algorithm, the authors implemented it in a system code with an initial mesh generator and a McCormack finite volume scheme on quadrilateral cells for hyperbolic vector systems. Results are presented for several computational examples. The moving mesh scheme reduces dispersion errors near shocks and wave fronts and thereby reduces the grid requirements necessary to compute accurate solutions while increasing computational efficiency.

DESCRIPTORS: (U) *MESH, *PARTIAL DIFFERENTIAL EQUATIONS, TIME DEPENDENCE, BOUNDARY VALUE PROBLEMS, PROBLEM SOLVING, ALGORITHMS

IDENTIFIERS: (U) Component Reports

AD-PO04 940

AD-C037 392L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-B095 823L 11/9 19/1

MISSION RESEARCH CORP ALBUQUERQUE NM

MORTON THIKOL INC HUNTSVILLE AL HUNTSVILLE DIV

(U) Beam Propagation Study: Stabilization of the Resistive Hose Instability in Intense Electron Beams.

(U) Control of the Urethane Cure Reaction with Solid, Blocked Isocyanates.

DESCRIPTIVE NOTE: Final rept..

DESCRIPTIVE NOTE: Annual rept. 26 Jun 84-25 Jun 85.

JUL 84 63P

AUG 85 17P

PERSONAL AUTHORS: Adler, R. J. ; Kiuttu, G. F. ; Richter-Sand, R. J. ;

PERSONAL AUTHORS: Graham, W. H. ;

REPORT NO. AMRC-R-598

REPORT NO. U-85-4544A

CONTRACT NO. F49620-83-C-0128, F28801-83-C-0050

CONTRACT NO. F49620-84-C-0059

PROJECT NO. 2301

PROJECT NO. 2303

TASK NO. A7

TASK NO. B2

MONITOR: AFOSR
TR-85-0809

MONITOR: AFOSR
TR-85-0871

SECRET REPORT

UNCLASSIFIED REPORT

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Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; Jun 83. Other requests must be referred to AFOSR, Directorate of Chemical and Atmospheric Sciences, Bldg., 410, Bolling AFB, DC 20332.

DESCRIPTORS: (U) *ELECTRON BEAMS, *AIR, *BETATRONS, HIGH POWER, BEAMS(RADIATION), GROWTH(GENERAL), INTENSITY, PARTICLES, HUMIDITY, ROTATION, FREQUENCY, UNIDIRECTIONAL, CONDUCTIVITY, PROPAGATION, STABILITY, RATES

ABSTRACT: (U) The objective of this program is to demonstrate that solid, blocked isocyanates will initiate cure of polyfunctional alcohols only above their melting points, thus providing indefinite potlife below this melting point and a rapid and controllable cure above the melting or trigger temperature. Work has been performed under each of the four tasks of the program. The literature has been searched and screening tests have been performed to identify attractive curing agents. These materials and their melting points are listed. Characterization of the solid, blocked isocyanates included melting point determinations and infrared spectral and x-ray crystallographic analyses. Initial demonstration of the 'trigger-cure' concept was accomplished with carbon-filled gumstocks of HTPB and the solid, blocked isocyanate of 0-nitrophenol and 2,4-toluendiisocyanate (TDI). Originator supplied keywords include: Solid propellant; Reduced smoke propellants.

IDENTIFIERS: (U) *Hose instability, WUAFOSR2301A7, PE81102F

AD-C037 311L

AD-B095 823L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-B095 823L CONTINUED

AD-A160 616 12/1

DESCRIPTORS: (U) *CURING AGENTS, *ISOCYANATES, *SOLID ROCKET PROPELLANTS, MELTING POINT, SOLID PROPELLANTS, CHEMICAL REACTIONS, CURING, URETHANES, SMOKE, TEMPERATURE, COMPOSITE PROPELLANTS, PROPELLANTS, REDUCTION, SMOKE, ALCOHOLS, SOLID PROPELLANT ROCKET ENGINES

STANFORD UNIV CA DEPT OF STATISTICS

(U) Assessing System Reliability Using Censoring Methodology.

IDENTIFIERS: (U) HTPB(Hydroxy Terminated Polybutadiene), WJAFOSR2302B2, PE61102F

DESCRIPTIVE NOTE: Technical rept.,

SEP 85 19P

PERSONAL AUTHORS: Doss,H. ;Freitag,S. ;Proschan,F. ;

REPORT NO. TR-364, AFOSR-TR-85-183

CONTRACT NO. N00014-76-C-0475, F49620-85-C-0007

MONITOR: AFOSR
TR-85-0954

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Also available as report no. FSU-M711.

ABSTRACT: (U) This document describes a problem which is of practical and theoretical importance in reliability. Under study is a coherent structure consisting of n independent components. The structure is observed continuously until it fails. For components failing before or at system failure time, we observe complete lifetimes; for components still functioning at system failure time we observe censored lifetimes. For the system we observe system lifetime. From a sample of m such structures we wish to estimate the system lifetime distribution. As far as we know, this problem has not been solved or even treated in the literature. In this paper we propose an estimator of the system lifetime distribution, as a by-product, we also obtain estimates of the mean and quantiles of the system lifetime and of all the corresponding quantities for component lifetimes. In Section 2 we give several asymptotic results concerning the estimators. In Section 3 we present and discuss two boot-strap schemes that are used in small samples to assess the variability of our estimates and to construct confidence intervals. Keywords: Statistics; Censored data.

DESCRIPTORS: (U) *STATISTICAL FUNCTIONS, COHERENCE, ESTIMATES, MEAN, PARTS, SAMPLING, RELIABILITY, CONFIDENCE LIMITS, INTERVALS, FAILURE, TIME, SYSTEMS APPROACH,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 816 CONTINUED

CENSORSHIP

IDENTIFIERS: (U) MUNRO42267

AD-A160 598 9/2

NEW YORK STATE CENTER FOR ADVANCED TECHNOLOGY IN COMPUTER APPLICATIONS AND SOFTWARE ENGINEERING SYRACUSE

(U) Interim Report - Grant AFOSR-85-0065.

DESCRIPTIVE NOTE: Rept. for 1 Oct 84-30 Jun 85.

JUN 85 10P

PERSONAL AUTHORS: Strait, B. J. ;

CONTRACT NO. AFOSR-85-0065

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0875

UNCLASSIFIED REPORT

ABSTRACT: (U) The DOD University Research Instrumentation grant together with cost sharing by Syracuse University and grants/ discounts from equipment manufacturers has created a sizable research facility of Syracuse, including a VAX 11/780 system, 4 AED graphics terminals, a Hewlett Packard Drafting plotter and an Imager Laser printer. Research projects being supported include New Generation Knowledge Processing, Concurrent Computer Architectures for Unification Operations, Construction of a Multiprocessor Reduction Machine for the Support of Logic Programming, Logic Programming and Knowledge Base Maintenance and An Initial Architecture for the Solution of the Partial-Match Retrieval Problem in the Context of Logic Programming. (Author)

DESCRIPTORS: (U) *COMPUTERS, *CONFIGURATIONS, COMPUTER LOGIC, COMPUTER GRAPHICS, COMPUTER ARCHITECTURE, MULTIPROCESSORS, MAINTENANCE, COSTS, SHARING, MANUFACTURING, COMPUTER PROGRAMMING, DRAFTING, PLOTTERS, TERMINALS, RESEARCH FACILITIES

IDENTIFIERS: (U) VAX 11/780 computers, Logic programming, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A160 591 4/1 17/9

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

UTAH STATE UNIV LOGAN SPACE DYNAMICS LABS

(U) Limiting Properties of Large System of Random Linear Equations.

(U) The STATE (Structure and Atmospheric Turbulence Environment) Experiment - Overview.

DESCRIPTIVE NOTE: Interim rept.,

DESCRIPTIVE NOTE: Interim rept. Jun 83-Jun 84,

OCT 85 22P

84 31P

PERSONAL AUTHORS: Bai, Z. D. ;

PERSONAL AUTHORS: Philbrick, C. R. ; Sipler, D. P. ; Balsley, B. B. ; Utwick, J. C. ;

REPORT NO. TR-84-41

CONTRACT NO. F49620-85-C-0008

CONTRACT NO. F49620-83-C-0122

PROJECT NO. 2304

PROJECT NO. 2310

TASK NO. A5

TASK NO. A1

MONITOR: AFOSR TR-85-0859

MONITOR: AFOSR TR-85-0872

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) S. Geman and Chi R. Hwang proposed a kind of algebraic systems of equations and proved the law of large numbers for its solution. In this paper, the conditions to ensure these results are significantly weakened for the law of large numbers. Also, the central limit theorem is shown. For both the law of large numbers and the limit theorem, the only needed assumption is that the random variables have finite second moment. Keywords: Multivariate analysis; Matrices(Mathematics). (Author)

DESCRIPTORS: (U) *LINEAR ALGEBRAIC EQUATIONS, LIMITATIONS, MULTIVARIATE ANALYSIS, RANDOM VARIABLES, THEOREMS, MATRICES(MATHEMATICS)

IDENTIFIERS: (U) *Large numbers, PE61102F, WUAFOSR2304A5

ABSTRACT: (U) The Structure and Atmospheric Turbulence Environment (STATE) experiment was conducted at Poker Flat Research Range, Alaska during the first two weeks of June 1983. In situ measurements of the atmospheric properties have been compared to the MST radar signals in an effort to interpret the dynamical conditions in the middle atmosphere. The measurements were made during the summer season at PFRR based on the large signals which have been measured by the MST radar over the past several years. Rockets with probes which can measure the electron irregularities with high spatial resolution were launched on three occasions which corresponded to selected conditions observed in real time in the radar data. In one of these cases, several other instruments were launched to study the structure of the neutral atmosphere. Profiles of density, temperature, wind and turbulence properties were measured. This paper describes the experiment and introduces the several scientific papers to follow. (Author)

DESCRIPTORS: (U) *MESOSPHERE, *ATMOSPHERIC MOTION, *ATMOSPHERIC SOUNDING, SOUNDING ROCKETS, *ATMOSPHERIC DENSITY, *ATMOSPHERIC TEMPERATURE, WIND, EARTH ATMOSPHERE, ALASKA, DYNAMICS, HIGH RESOLUTION, SPATIAL DISTRIBUTION, PROFILES, RADAR, REAL TIME, ENVIRONMENTS, TURBULENCE,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 591 CONTINUED

ELECTRONS, NEUTRAL, RADAR SIGNALS

IDENTIFIERS: (U) STATE(Structure and Atmospheric
Turbulence Environment), Atmospheric structure, Poker
Flat Research Range, PE61102F, WUAFOSR2310A1

AD-A160 516 12/1

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL
SCIENCES

(U) Estimation of Palm Measures of Stationary Point
Processes.

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 15P

PERSONAL AUTHORS: Karr, A. F. ;

REPORT NO. TR-433

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0815

UNCLASSIFIED REPORT

ABSTRACT: (U) Estimators of the Palm measure of a stationary point process on a finite-dimensional Euclidean space are developed and shown to be strongly uniformly consistent. From them, similarly consistent estimators of reduced moment measures, the spectral measure, the spectral density function and the underlying probability measure itself are derived. Normal and Poisson approximations to distributions of estimators are presented. Application is made to the problem of combined inference and linear state estimation. (Author)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, ESTIMATES, LINEARITY, MOMENTS, REDUCTION, PROBABILITY, NORMAL DENSITY FUNCTIONS, SPECTRAL ENERGY DISTRIBUTION, STATIONARY

IDENTIFIERS: (U) Euclidean space, *Stationary point processes, PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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ULTRASYSTEMS INC IRVINE CA

TENNESSEE UNIV KNOXVILLE PLASMA SCIENCE LAB

(U) Phospha-s-Triazines. IX. Chloro-Substituted Monophospha-s-Triazines and Derivatives,

(U) Annual Progress Report on Contract AFOSR-81-0093, March 15, 1984 to March 14, 1985.

85 13P

APR 85 273P

PERSONAL AUTHORS: Paciorek, K. J. L.; Nakahara, J. H.; Smythe, M. E.; Harris, D. H.; Kratzer, R. H.;

PERSONAL AUTHORS: Roth, J. R.;

CONTRACT NO. F49620-79-C-0037

REPORT NO. UTK-PSL-85-3

PROJECT NO. 2303

CONTRACT NO. AFOSR-81-0093

TASK NO. B2

PROJECT NO. 2301

MONITOR: AFOSR TR-85-0845

TASK NO. A8

MONITOR: AFOSR TR-85-0870

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v28 p441-452 1985.

ABSTRACT: (U) 1-Dichlorophospha-3,5-bis (perfluoro-n-heptyl)-2,4,6-triazine and one of its perfluoroalkylether analogues were synthesized by interaction of phosphorus pentachloride with the respective imidoylamidines; subsequent replacement of the chloro- by azido groups proceeded readily. 1-Chloro(phenyl)-phospha-3,5-bis(perfluoro-n-heptyl)-2,4,6-triazine was prepared by a parallel process using tetrachlorophenylphosphorane instead of phosphorus pentachloride; phenoxy and stearyloxy derivatives were formed without difficulty. All the compounds, with the exception of 1-stearyloxy(phenyl)phospha-3,5-bis(perfluoro-n-heptyl)-2,4,6-triazine, exhibited the characteristic mass spectral fragmentation patterns associated with the monophospha-s-triazine ring system.

DESCRIPTORS: (U) *AZINES, *PHOSPHORUS COMPOUNDS, *SYNTHESIS(CHEMISTRY), AZIDES, CHLORIDES, FRAGMENTATION, MASS SPECTRA, PATTERNS, PHOSPHORUS, FLUORINE, ALKYL RADICALS, ETHERS, REPRINTS

IDENTIFIERS: (U) Triazines, PE61102F, WUAFOSR2303B2

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ABSTRACT: (U) This annual progress describes work done under AFOSR Contract 81-0093 during the period from March 15, 1984 to March 14, 1985. The experimental program accomplished extensive measurements of RF emissions from the classical Penning discharge which is operated in the UTK Plasma Science Laboratory. RF emissions were observed over a wide frequency range, megahertz to more than 1 gigahertz. These emissions appear to be incoherent; the emitted radiation intensity is approximately proportional to the electron number density. An important accomplishment underlying these RF emission measurements was the development a calibrated, broadband antenna with an approximately 100 megahertz to 1.2 gigahertz. Keywords include: Turbulence; Plasma Physics; High Temperature Plasma; RF Plasma Emissions; Electric Field Dominated Plasma; RF sources; RF Emitters; Penning Discharge; Two Beam Instabilities; Transmit Time Magnetic Pumping; Collisional Magnetic Pumping.

DESCRIPTORS: (U) *PUMPING(ELECTRONICS), *PLASMAS(PHYSICS), *RADIOFREQUENCY GENERATORS, BROADBAND ANTENNAS, COLLISIONS, ELECTRON DENSITY, EMISSION, EMITTERS, HIGH TEMPERATURE, MAGNETIC FIELDS, MEASUREMENT, RADIOFREQUENCY

IDENTIFIERS: (U) *Penning discharges, WUAFOSR2301A8, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 422 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) A Note on Asymptotic Joint Distribution of the Eigenvalues of a Noncentral Multivariate F Matrix.

DESCRIPTIVE NOTE: Technical rept.,

NOV 84 17P

PERSONAL AUTHORS: Bai, Z. D. ;

REPORT NO. TR-84-49

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0813

UNCLASSIFIED REPORT

ABSTRACT: (U) In an article written by HSU, the proof of the basic Lemma 3 is based on Lemma 1 which is wrong. The aim of this document is to correct the proof of Lemma 3 and consequently to ensure the main theorem in Hsu's work. Keywords: Hsu's theorem; Limiting distribution; Normal populations. (Author)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *NORMAL DISTRIBUTION, ASYMPTOTIC SERIES, EIGENVALUES, LIMITATIONS, THEOREMS, MATRICES(MATHEMATICS)

IDENTIFIERS: (U) HSU theorem, WUAFOSR2304A5, PEG1102F

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OHIO STATE UNIV COLUMBUS DEPT OF CHEMISTRY

(U) Symposium on Molecular Spectroscopy (40th) Held at Columbus, Ohio on 17-21 June 1985.

DESCRIPTIVE NOTE: Final rept.,

JUN 85 169P

PERSONAL AUTHORS: Rao, I. N. ;

CONTRACT NO. AFOSR-85-0145

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-85-0799

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent years have witnessed the development of powerful experimental techniques that have allowed the observation of finer details of molecular spectra with a resolution not conceived as possible even in the recent past. Therefore, in interpreting the laboratory data it has become necessary to re-examine the theory. Document provides abstracts of all 275 papers presented at the symposia.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *INFRARED SPECTRA, ABSTRACTS, EXPERIMENTAL DATA, SYMPOSIA, HIGH RESOLUTION, MOLECULAR BEAMS, BAND SPECTRA, EMISSION SPECTRA, RAMAN SPECTRA, VIBRATIONAL SPECTRA, ENERGY TRANSFER, LASER BEAMS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2310A1

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DTIC REPORT BIBLIOGRAPHY, SEARCH CONTROL NO. EVK15N

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EYE RESEARCH INST OF RETINA FOUNDATION BOSTON MA

SYSTEMS, MEASUREMENT, COLORS, CONTRAST, SLOPE, THRESHOLD
EFFECTS, GRADIENTS, SPATIAL DISTRIBUTION, INTEGRALS,
IMAGES, SUBSURFACE, PATTERNS, STIMULI

(U) Eye Movements and Spatial Pattern Vision.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 84-31 Jan 85.

IDENTIFIERS: (U) *Spatial pattern vision, WUAFOSR2313A5,
PE61102F

FEB 85 25P

PERSONAL AUTHORS: Arend, L. E. ;

CONTRACT NO. F49620-83-C-0052

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0741

UNCLASSIFIED REPORT

ABSTRACT: (U) Low contrast, low spatial frequency luminance sawtooth patterns look like luminance staircases, with no brightness changes over the shallower luminance slope. Brightness measurements at corresponding points in different cycles of these patterns showed substantial illusory brightness differences. Other measurements showed that the illusion is not confined to strictly subthreshold luminance gradients, but occur with slightly suprathreshold gradients as well. In models which attempt to explain these illusions the visual system integrates over the thresholded gradient of the stimulus distribution. The integration encounters problems due to curl introduced by the nonlinear threshold operator. Brightness measurements indicated that these problems have a visual counterpart, further support for the models. Several new illusions were found to result from this nonlinear threshold for spatial gradient. Inconsistencies in the spatial integrals performed by the visual system result in multistable brightness perceptions for some patterns. Originator-supplied keywords: Eye movements, Spatial pattern vision, Stabilized retinal images, Visual illusions, Brightness constancy, Color constancy.

DESCRIPTORS: (U) *VISUAL PERCEPTION, *EYE MOVEMENTS,
*VISION, PATTERN RECOGNITION, OPTICAL IMAGES, BRIGHTNESS,
PERCEPTION, CYCLES, ILLUSIONS, LUMINANCE, NONLINEAR

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AD-A160 349 17/9

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL
ENGINEERING AND COMPUTER SCIENCES

(U) Exact Performance Analysis of the Censored Mean-Level
Detector in a Multiple-Target Environment.

JUL 85 34P

PERSONAL AUTHORS: Ritcey, J. A. ;

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0752

UNCLASSIFIED REPORT

ABSTRACT: (U) The censored mean-level detector (CMLD) is
an alternative to the mean-level detector that achieves
robust detection performance in a multiple-target
environment by censoring several of the largest samples
of the maximum-likelihood estimate of the background
noise level. Here we derive exact expressions for the
probability of detection of the CMLD in a multiple-target
environment when a fixed number of Swerling II targets
are present. The primary target is modelled by Swerling
case II, and only single-pulse processing is analyzed.
Optimization of the CMLD parameters is considered, and a
comparison to other detectors is presented. Keywords
include: Radar; Detection; and Multiple targets.

DESCRIPTORS: (U) *TARGET DETECTION, *RADAR TARGETS,
BACKGROUND NOISE, DETECTION, MULTIPLE OPERATION, TARGETS,
OPTIMIZATION, ENVIRONMENTS, PERFORMANCE TESTS, DETECTION,
PROBABILITY

IDENTIFIERS: (U) CMLD(Censored Mean Level Detectors),
Maximum likelihood estimation, Multiple targets,
WUAFOSR2304A5, PE61102F

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AD-A160 348 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Optimally Bounded Score Functions for Generalized
Linear Models with Applications to Logistic Regression.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

APR 85 21P

PERSONAL AUTHORS: Stefanski, L. A. ; Carroll, R. J. ; Ruppert,
D. ;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0868

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Cornell
Univ., Ithaca, NY. Dept. of Economic and Social
Statistics.

ABSTRACT: (U) This document studied optimally bounded
score functions for estimating regression parameters in a
generalized linear model. This work extends results
obtained by Krasker & Welsch (1982) for the linear model
and provides a simple proof of Krasker and Welsch's first
order condition for strong optimality. The application of
these results to logistic regression is studied in some
detail with an example given comparing the bounded
influence estimator with maximum likelihood. Additional
keywords: Outliers; Robustness; Influential points.
(Author)

DESCRIPTORS: (U) *ESTIMATES, FUNCTIONS(MATHEMATICS),
LINEAR SYSTEMS, LINEARITY, LOGISTICS, MATHEMATICAL MODELS,
PARAMETERS, REGRESSION ANALYSIS, SCORING, OPTIMIZATION,
MAXIMUM LIKELIHOOD ESTIMATION

IDENTIFIERS: (U) Outliers, Robustness, Influential
points, WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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COLORADO STATE UNIV FORT COLLINS DEPT OF STATISTICS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Multivariable Problems of Statistics and Problem Theory.

(U) Double Sampling in Estimation of a Ratio.

DESCRIPTIVE NOTE: Annual rept. Apr 84-Apr 85.

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 4P

JUN 85 24P

PERSONAL AUTHORS: Srivastava, J. ;

PERSONAL AUTHORS: Ahmad, M. ; Marcotte, C. ; Singh, R. S. ;

REPORT NO. 03-2516

REPORT NO. TR-85-24

CONTRACT NO. AFOSR-83-0080

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0771

TR-85-0750

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) During 1984-85 two papers were published, two were submitted and three are in process. Work in Reliability, Multivariate Analysis and Information Theory continued. Additional keywords: Statistical design criteria; Ideal theory; Nested multidimensional block design; Search decision rules; Cyclotomic fields; Probability of correct search. (Author)

ABSTRACT: (U) Problems connected with the estimation of the ratio of the means of a finite bivariate population have been considered in this report. The usual estimator of the ratio, based on the means of a bivariate simple random sample drawn without replacement (s.r.s. (w.o.r.)), has been compared with estimators based on alternative double sampling design. Under this design a very large s. r.s. (w.o.r.) is drawn for measuring only one of the variables and a subsample (s.r.f. (w.o.r.)) is drawn out of the first phase units for measuring the other variable. Efficiency and bias comparisons have been made by subjecting each of the competitors to the same budgetary constraint. It turns out that deviation from the usual set-up sometimes leads to better sampling strategies. Additional keywords: Mean square errors; Statistical inference; Multivariate analysis; Approximation(Mathematics). (Author)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, DECISION THEORY, INFORMATION THEORY, RELIABILITY, SEARCHING, STATISTICS, THEORY

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DESCRIPTORS: (U) *SAMPLING, *ESTIMATES, *RATIOS, ERRORS, MEAN, STATISTICAL INFERENCE, MULTIVARIATE ANALYSIS, STRATEGY, BIVARIATE ANALYSIS, POPULATION(MATHEMATICS), APPROXIMATION(MATHEMATICS)

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY RABBITS

(U) Biological Investigations of Adaptive Networks. WJAFOSR2312A1, PEB1102F
Neuronal Control of Conditioned Responding. IDENTIFIERS: (U)

DESCRIPTIVE NOTE: Annual technical rept. no. 2, 30 Apr 84-
20 May 85.

MAY 85 26P

PERSONAL AUTHORS: Moore, J. W. ;

CONTRACT NO. AFOSR-83-0215

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-85-0746

UNCLASSIFIED REPORT

ABSTRACT: (U) Neurobiological investigations of adaptive neural networks were conducted using the classically conditioned nictitating membrane response (NM CR) of rabbit, a widely used model system for studies of learning. One experimental approach involved recording from single brain neurons from awake, behaving animals for the purpose of determining the loci and characteristics of neurons with activity correlated with the NM CR or its inhibition. A second approach involved the use of discrete brain lesions that selectively eliminate the NM CR while at the same time sparing the basic reflex pathway. A third approach employed fiber-tracing anatomical techniques designed to clarify the inter-connectivity among brain regions essential for the NM CR. These regions include discrete portions of the cerebellum and brain stem. Information from physiological studies has been incorporated into mathematical models of learning used by adaptive network researchers, and anatomical findings have guided the development of related neuronal models.

DESCRIPTORS: (U) *NEURAL NETS, *ELECTROENCEPHALOGRAPHY, *CONDITIONED RESPONSE, *NERVE CELLS, ADAPTIVE SYSTEMS, REFLEXES, BRAIN, REGIONS, CEREBELLUM, INHIBITION, MODELS, NETWORKS, LESIONS, LEARNING, MATHEMATICAL MODELS, CONTROL,

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MARYLAND UNIV COLLEGE PARK DIV OF MATHEMATICAL AND
PHYSICAL SCIENCES AND ENGINEERING

VACUUM, VACUUM CHAMBERS

IDENTIFIERS: (U) WJAFDSR2301A7, PE61102F

(U) Propagation of Intense Charged Particle Beams into
Vacuum.

DESCRIPTIVE NOTE: Annual progress rept. 1 Apr 84-31 Mar
85.

MAR 85 82P

PERSONAL AUTHORS: Destler, W. W.; Reiser, M. P.; Rhee, M. J.
; Striffler, C. D.;

CONTRACT NO. AFOSR-84-0091

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0854

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past year the experimental facilities have been augmented by the construction of a large diameter (60cm) vacuum chamber with and array of radial current collectors to support detailed studies of beam propagation characteristics, and a new pulsed magnetic field coil (surplus) from the Autoresonant Accelerator project. This new coil provides much more uniform fields over a longer axial length than did the previous coils. In addition, a Department of Defense University Instrumentation award is currently being used to construct a completely digital fast data acquisition system. This system, currently under installation in a special shielded room in the laboratory, will allow much greater flexibility in the manner in which we acquire and process data and hopefully will eventually reduce the yearly expenditures for Polaroid oscilloscope camera film. (Author)

DESCRIPTORS: (U) *CHARGED PARTICLES, *PARTICLE BEAMS,
*DATA ACQUISITION, AUGMENTATION, AXES, BEAMS(RADIATION),
COILS, CONSTRUCTION, DIAMETERS, DIGITAL SYSTEMS,
ELECTROMAGNETIC WAVE PROPAGATION, INTENSITY, LENGTH,
OSCILLOSCOPES, PHOTOGRAPHIC FILM, SHIELDING, SPACE(ROOM).

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DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

TIME, TELECOMMUNICATIONS

(U) A Single Server Queue in a Hard-Real-Time Environment.

IDENTIFIERS: (U) Functional equations, First in first out, MUAFOSR2304K3, PE61102F

DESCRIPTIVE NOTE: Interim rept..

MAY 85 17P

PERSONAL AUTHORS: Trivedi, K. S. ;Baccellii, F. ;

REPORT NO. CS-1985-12

CONTRACT NO. AFOSR-84-0132, NSF-MCS83-0200

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-85-0747

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers a single server first in first out queue in which arriving task has to be completed within a certain period of time (its deadline). More precisely, each arriving task has its own deadline - a nonnegative real number - and as soon as the response time of one task exceeds its deadline, the whole system is considered to have failed. (In that sense the deadline is hard). The main practical motivation for analyzing such queues comes from the need to evaluate mathematically the reliability of computer systems working with real time constraints (space or aircraft systems for instance). The authors therefore are mainly concerned with the analytical characterization of the transient behavior of such a queue in order to determine the probability of meeting all hard deadlines during a finite period of time (the mission time). The probabilistic methods for analyzing such systems are suggested by earlier work on impatience in telecommunication systems. Additional keywords: functional equations. (Author).

DESCRIPTORS: (U) *MATHEMATICAL ANALYSIS, *REAL TIME, *QUEUEING THEORY, RELIABILITY(ELECTRONICS), EQUATIONS, FUNCTIONAL ANALYSIS, MOTIVATION, METHODOLOGY, PROBABILITY, REACTION TIME, BEHAVIOR, TRANSIENTS, COMPUTERS, MISSIONS.

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL
AND COMPUTER ENGINEERING

(U) A Note on an Integrated Cauchy Functional Equation.
DESCRIPTIVE NOTE: Technical rept.

(U) Multi-Disciplinary Techniques for Understanding Time-
Varying Space-Based Imagery.

APR 85

14P

DESCRIPTIVE NOTE: Annual rept. May 84-May 85.

PERSONAL AUTHORS: Lau, K. S. ; Gu, H. M. ;

MAY 85

136P

REPORT NO. TR-85-10

PERSONAL AUTHORS: Casasent, D. ; Sanderson, A. ; Kanade, T. ;

CONTRACT NO. F49620-85-C-0008

CONTRACT NO. F49620-83-C-0100

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0818

MONITOR: AFOSR
TR-85-0863

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) In characterizing the semistable law, Shimizu reduced the problem into solving an equation where μ and ν are given positive measures on infinity. This document obtains a simple proof and shows that some of his conditions can be weakened. Additional keywords: Periodic functions; Random variable. (Author)

DESCRIPTORS: (U) *CAUCHY PROBLEM, *EQUATIONS, FUNCTIONAL ANALYSIS, PERIODIC FUNCTIONS, NUMERICAL INTEGRATION, RANDOM VARIABLES, PROBLEM SOLVING

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is a multidisciplinary effort between 3 departments and principal investigators. It intends 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. (Author)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *OPTICAL PROCESSING, *PATTERN RECOGNITION, *IMAGE PROCESSING, MODELS, WORK, METHODOLOGY, PROCESSING, GRAPHS, MATCHING, PROBABILITY, IMAGES, STEREOSCOPIC DISPLAY SYSTEMS, DYNAMIC PROGRAMMING, SPACE BASED

IDENTIFIERS: (U) PE61102F

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MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

(U) Analysis of Preprocessors and Decision Aids in Organizations.

(U) Hierarchical Multisensor Image Understanding.

DESCRIPTIVE NOTE: Final rept. Oct 83-Aug 85.

DESCRIPTIVE NOTE: Technical rept.,

AUG 85 129P

FEB 85 8P

PERSONAL AUTHORS: Chyen, G. H. L. ; Levis, A. H. ; Kim, Y. ; Mader, S. ; Aggarwal, R. K. ; Bazakos, M. ; Budenske, J.

REPORT NO. LIDS-P-1438

CONTRACT NO. F49620-83-C-0134

CONTRACT NO. AFOSR-80-0229

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A1

MONITOR: AFOSR TR-85-0801

MONITOR: AFOSR TR-85-0819

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ABSTRACT: (U) The use of preprocessors and decision aids in command, control and communication (C3) systems is meant to reduce the workload of individual decisionmakers and improve the quality of an organization's decisionmaking. An information theoretic framework is used to model the decision aids. Thus, it becomes possible to evaluate quantitatively the effect a decision aid has on the workload of a decisionmaker and to derive necessary conditions that preprocessors (a generic form of decision aids) must satisfy in order that they reduce the human's workload.

DESCRIPTORS: (U) *DECISION MAKING, *COMMAND AND CONTROL SYSTEMS, *COMMUNICATION AND RADIO SYSTEMS, HUMANS, WORKLOAD, INFORMATION THEORY, DECISION THEORY, PROCESSING EQUIPMENT

IDENTIFIERS: (U) Decision aids, Preprocessors, PE61102F, WJAFOSR2304A1

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AD-A160 324

ABSTRACT: (U) This report describes the research results on Honeywell's Hierarchical Multisensor Image Understanding program. Honeywell is developing a unified framework for the different hierarchical levels of image processing such as segmentation, detection, classification, and identification of outdoor scenes and across different sensor modalities such as millimeter wave, infrared, and visible. Current activities on the project are reviewed under the following headings: (1) A Survey of Multisensor Information Fusion Systems; (2) The Role of Structure in Human and Machine Perception; (3) A Knowledge Based Image Segmentation System; (4) The Use of Optical Flow as a Depth Cue in Scene Analysis and (5) Belief Maintenance for A Fuzzy Reasoning System. Keywords include: Image processing; Image understanding; Artificial intelligence; and Scene analysis.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *IMAGES, *IMAGE PROCESSING, DETECTION, MULTISENSORS, FLOW, OPTICAL PROPERTIES, SEGMENTED, REASONING, IDENTIFICATION, OUTDOOR, MILLIMETER WAVES, STRUCTURAL PROPERTIES

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A7

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A160 323 CONTINUED

NORTHWESTERN UNIV EVANSTON IL DEPT OF ENGINEERING
SCIENCE AND APPLIED MATHEMATICS

(U) First Passage Times in Stochastic Differential
Equations of Mathematical Physics and Engineering.

IDENTIFIERS: (U) Kramers problem, Kolmogorov equation,
PEG1102F

DESCRIPTIVE NOTE: Final rept. 1 Apr 83-30 Mar 85.

APR 85 6P

PERSONAL AUTHORS: Matkovsky, B. J. ;

CONTRACT NO. AFOSR-83-0088

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-85-0767

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of our study was to develop new asymptotic and singular perturbation methods for the analysis of random phenomena, and their application in various areas of science and engineering. We have studied the problems of 1) atomic migration in crystals, 2) ionic and super-ionic conductivity, 3) chemical reaction rates, surface desorption rates, and more general activated rate processes, 4) noise effects on the hysteretic Josephson junction, D.C.-SQUID, and other tunnel junction devices, 5) stability and reliability of randomly loaded elastic structures, 6) relative stability of various multi-stable systems, among others. Considerable success has been achieved, not only in developing new mathematical methods, but in solving a number of problems whose solution has long been outstanding. These include the Kolmogorov Exit Problem and the Kramers nonlinear diffusion problem, among others.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, ELECTRICAL CONDUCTIVITY, REACTION KINETICS, ASYMPTOTIC SERIES, PERTURBATIONS, CRYSTALS, ACTIVATION, RATES, IONIC CURRENT, IONS, MATHEMATICS, PHYSICS, NOISE, STABILITY, CHEMICAL REACTIONS, REACTION TIME, NUMERICAL METHODS AND PROCEDURES, HYSTERESIS, JOSEPHSON JUNCTIONS, ELASTIC PROPERTIES, LOADS(FORCES), STRUCTURES.

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Remarks on the Foundations of Measures of Dependence.

(U) Some Comments on the Design of Quantizers.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 80-30 Sep 85.

JUN 85 55P

MAY 85 9P

PERSONAL AUTHORS: Bradley, R. C. ; Bryc, W. ; Janson, S. ;

PERSONAL AUTHORS: Abaya, E. F. ; Wise, G. L. ;

REPORT NO. TR-105

CONTRACT NO. AFOSR-81-0047

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0877

TR-85-0774

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper is a study of several aspects of measures of dependence, the various comparisons between them, and their foundation as norms of the bilinear form covariance. Additional keywords: stochastic processes; triangles; inequalities; Banach space; random variables; vector analysis; Hilbert space. (Author)

SUPPLEMENTARY NOTE: Presented at the Proceedings of the Annual Allerton Conference on Communication, Control, and Computing, 3-5 Oct 84, Monticello, IL.

ABSTRACT: (U) In many applications involving quantization the probability distribution of the input signal is unknown. However, most of the algorithms for optimal scalar or vector quantization require an explicit distribution function or probability density. This paper shows that under certain conditions reasonable quantizer designs can be expected when standard algorithms are applied to estimates of distribution functions. (Author).

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *MEASUREMENT, BANACH SPACE, HILBERT SPACE, RANDOM VARIABLES, TRIANGLES, VECTOR ANALYSIS

IDENTIFIERS: (U) *dependence, PE61102F, WUAFOSR2304A5

DESCRIPTORS: (U) *QUANTIZATION, ALGORITHMS, DISTRIBUTION FUNCTIONS, INPUT, OPTIMIZATION, PROBABILITY DENSITY FUNCTIONS, PROBABILITY DISTRIBUTION FUNCTIONS, SCALAR FUNCTIONS, SIGNAL VECTOR ANALYSIS, ESTIMATES

IDENTIFIERS: (U) Quantizers, PE61102F, WUAFOSR2304A5

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A160 319 12/1

CARNEGIE-MELLON UNIV PITTSBURGH PA ROBOTICS INST

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) ISIS - A Knowledge-Based System for Factory Scheduling.

(U) On Time Delay Estimation Involving Received Signals.

DESCRIPTIVE NOTE: Technical rept..

AUG 84 9P

JUL 84 26P

PERSONAL AUTHORS: Wu, C. Y. ; Pearson, A. E. ;

PERSONAL AUTHORS: Fox, M. S. ; Smith, S. F. ;

CONTRACT NO. AFOSR-82-0230

CONTRACT NO. F49620-82-K-0017

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A1

TASK NO. A7

MONITOR: AFOSR
TR-85-0778

MONITOR: AFOSR
TR-85-0778

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Expert Systems, v1 n1 p25-49
Jul 84.

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Acoustics, Speech, and Signal Processing, VASSP-32 n4
p828-835 Aug 84.

ABSTRACT: (U) Analysis of the job shop scheduling domain has indicated that the crux of the scheduling problem is the determination and satisfaction of a large variety of constraints. Schedules are influenced by such diverse and conflicting factors as due date requirements, cost restrictions, production levels, machine capabilities and substitutability, alternative production processes, order characteristics, resource requirements, and resource availability. This paper describes ISIS, a scheduling system capable of incorporating all relevant constraints in the construction of job shop schedules. We examine both the representation of constraints within ISIS, and the manner in which these constraints are used in conducting a constraint-directed search for an acceptable schedule. The important issues relating to the relaxation of constraints are addressed. Finally, the interactive scheduling facilities provided by ISIS are considered.

DESCRIPTORS: (U) *SCHEDULING, *INDUSTRIAL PLANTS, *COMPUTER APPLICATIONS, COSTS, FACILITIES, INTERACTIONS, PRODUCTION, REQUIREMENTS, RESOURCES, AVAILABILITY, SHOPS(WORK AREAS), REPRINTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A7

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TRANSMITTING, TRANSFER FUNCTIONS, BIAS, YIELD

IDENTIFIERS: (U) PE61102F, WUAFSOR2304A1

AD-A160 317 9/4

ARKANSAS UNIV FAYETTEVILLE DEPT OF ELECTRICAL
ENGINEERING

(U) Adaptive Hybrid Picture Coding. Volume 2.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84,

FEB 85 184P

PERSONAL AUTHORS: Jones, R. A. ; Bowling, C. D. ; Tejwani, Y.
J. ;

CONTRACT NO. AFOSR-82-0351

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR
TR-85-0922

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A160 316.

ABSTRACT: (U) A system for the machine recognition of partial shapes is described. Shape analysis methods are reviewed in context to the problem of machine recognition of partial shapes, and their limitations. The problem of defining the critical points for shapes and partial shapes with various degrees of curvature is considered. It is shown that the critical points derived using criteria based on curvature alone are insufficient to describe shapes represented by smooth curves. A new method of shape analysis is described which exhibits superior performance over the critical point detection methods based on curvature alone. The critical points determined by this method are based on a set of coordinate axes that are dependent on the shape itself. This guarantees that the critical points detected are independent of size, rotation, and displacement of the shape. The results of applying this new procedure to actual shapes are demonstrated and discussed.

DESCRIPTORS: (U) *MACHINE CODING, *PATTERN RECOGNITION, *SHAPE, ADAPTIVE SYSTEMS, CODING, HYBRID SYSTEMS, PICTURES, DETECTION, METHODOLOGY, DISPLACEMENT, SHAPE, SIZES(DIMENSIONS), AXES, COORDINATES, CURVATURE

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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IDENTIFIERS: (U) PEG1102F. WJAFOSR2305B3

ARKANSAS UNIV FAYETTEVILLE DEPT OF ELECTRICAL
ENGINEERING

(U) Adaptive Hybrid Picture Coding. Volume 1.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.

FEB 85 179P

PERSONAL AUTHORS: Jones, R. A. ; Bowling, C. D. ; Tejwani, Y.
J. ;

CONTRACT NO. AFOSR-82-0351

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR
TR-85-0740

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A160 317.

ABSTRACT: (U) With the introduction and proliferation of computers into all facets of the work place and the home environment, a new awareness of the capabilities and shortcomings of the computer for various tasks has been found. The computer has proven very useful in performing repetitive, mundane tasks in offices and manufacturing process control environments, but lack of a good real-world/computer interface prohibits many uses. Presently a world/computer interface prohibits many uses. Presently a computers input connections to the real-world consist mainly of a keyboard and in some instances joysticks, graphics pads, light pens, and other sensors of the physical world. Recent research into this interface has provided the computer with 'ears', that is to say speech recognition. Not only can the computer hear, but it can also act upon human voice commands and speech. A 'voice' and associated language generation has also recently become a reality. The computer can generate syntactically correct language and then change this into intelligible human sounding speech. Perhaps the most important, and by far the most complex, interface would be the one which gives the computer 'eyes' or sight. Providing the computer with eyes and vision opens new realms for computer automation that in the past were either too

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difficult to perform blindly or completely impossible.

RENSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

DESCRIPTORS: (U) *IMAGE PROCESSING, *PICTURES, ADAPTIVE SYSTEMS, CODING, HYBRID SYSTEMS, COMPUTERS, EYE, AWARENESS, AUTOMATION, COMPUTERS, INTERFACES, SPEECH, VISION

(U) Adaptive Refinement Methods for Nonlinear Parabolic Partial Differential Equations.

IDENTIFIERS: (U) *Hybrid picture coding, Computer vision, PEG1102F, WUAFOSR2305B3

DESCRIPTIVE NOTE: Interim rept.,

DEC 84 35P

PERSONAL AUTHORS: Bieterman, M. ; Flaherty, J. E. ; Moore, P. K. ;

CONTRACT NO. AFOSR-80-0192

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0827

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Boeing Computer Services, Tukwila, WA. Engineering Technology Applications Div.

ABSTRACT: (U) This document considers two adaptive finite element techniques for parabolic partial differential equations (PDEs) that are based on using error estimates to control mesh refinement. One technique is a method of lines approach that uses a Galerkin method to discretize the PDEs in space and implicit multi-step integration in time. Spatial elements are added and deleted in regions of high and low error and are all advanced with the same sequence of varying time steps. The second technique is a local refinement method that uses Galerkin approximations in both space and time. Fine grids of space-time elements are added to coarser grids and the problem is recursively solved in regions of high error. (Author)

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *FINITE ELEMENT ANALYSIS, *NONLINEAR DIFFERENTIAL EQUATIONS, GRIDS, MESH, CONTROL, ERROR ANALYSIS, ERRORS, REFINING, SPACE PERCEPTION, TIME, ESTIMATES

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DTIC REPORT BIBLIOGRAPHY · SEARCH CONTROL NO. EVK15N

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IDENTIFIERS: (U) Parabolic equations, Method of lines approach, Galerkin methods, Local refinement method, P1E61102F, WUAFOSR2304A3

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Performance and Reliability Analysis Using Directed Acyclic Graphs.

DESCRIPTIVE NOTE: Technical rept..

APR 85 41P

PERSONAL AUTHORS: Sahner, R. A. ; Trivedi, K. S. ;

REPORT NO. CS-1985-9

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0808

UNCLASSIFIED REPORT

ABSTRACT: (U) A computer powerful model for the stochastic analysis of directed acyclic graphs is developed. These graphs represent event-precedence networks where events may occur serially, probabilistically, or concurrently. When a set of events occurs concurrently, the condition for the set of events to complete is that any specified number of the events must complete. This includes the special cases that one or all of the events complete. The distribution function associated with an event is assumed to have exponential polynomial form. Further generality is obtained by allowing these distributions to have a mass at the origin and/or at infinity. The distribution function for the time taken to complete the entire graph is computed in a semi-symbolic form. Applications of the model for the evaluation of concurrent program execution time and to the reliability analysis of fault-tolerant systems are discussed. Additional keywords: fault trees; nodes; SPADE computer program; SPADE(Series Parallel Directed Acyclic Graph Evaluators).

DESCRIPTORS: (U) *GRAPHS, *COMPUTERIZED SIMULATION, COMPUTER PROGRAMS, DISTRIBUTION FUNCTIONS, FAULT TOLERANT COMPUTING, FAULT TREES, MODELS, RELIABILITY, STOCHASTIC

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PROCESSES, NETWORKS, NODES

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

IDENTIFIERS: (U) SPADE computer program, SPADE(SERIES Parallel Directed Acyclic Graph Evaluators), Event precedence networks, PE61102F, WUAFOSR2304AS

(U) White Light Optical Information Processing.

DESCRIPTIVE NOTE: Annual rept. no. 7 (Final), 30 Sep 81-31 Dec 84,

MAY 85 110P

PERSONAL AUTHORS: Leith,E. N. ;

CONTRACT NO. AFOSR-81-0243

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-85-0853

UNCLASSIFIED REPORT

ABSTRACT: (U) Methods for optical processing and holography with light of reduced coherence are described, including the making of holographic optical elements in light of reduced spatial or temporal coherence, phase conjugation with light of reduced coherence, and Fourier transformation spatial matched filtering in spatially and temporally incoherent light. Keywords include: optical processing; holography; white light; information processing; and phase conjugation.

DESCRIPTORS: (U) *OPTICAL PROCESSING, *WHITE LIGHT, INCOHERENT SCATTERING, INFORMATION PROCESSING, LIGHT, OPTICAL EQUIPMENT COMPONENTS, COHERENCE, HOLOGRAPHY, REDUCTION, SPATIAL DISTRIBUTION

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1

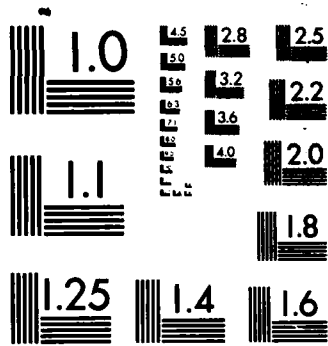
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Correlation and Collective Modes in Narrow Band Materials.

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

MAY 85 25P

PERSONAL AUTHORS: Ribarsky, M. W. ;

CONTRACT NO. AFOSR-80-0023

PROJECT NO. 2301

TASK NO. A6

MONITOR: AFOSR
TR-85-0879

UNCLASSIFIED REPORT

ABSTRACT: (U) Correlation and collective modes have been studied for systems with quite localized valence or conduction bands. In particular this research has been concerned with localized electron-hole states and how they contribute with other excitations to the dynamical response of the system. Important aspects studied have been the effects of exciton or exciton-like states on superconducting properties, electron energy loss spectra and optical spectra. Initially the system studied has been CuCl for which a tight-binding model was used. The results show that strong effects due to localized excitations of d-band electrons greatly affect the dynamical response and the effective electron interaction. Off-diagonal matrix elements of the inverse dielectric citation spectrum, producing exciton resonances in the band gap. The exciton resonance in the dynamical response is necessary to obtain the appropriate attractive effective electron interaction for superconductivity. Models have also been set up to relate the dynamical response including local field effects to the superconducting transition temperature and gap function. The strong localization effects also will affect the loss spectra and optical spectra. Keywords include: Transition metals; Copper; Correlation;; Excitons; Dielectric response; Interband excitation; Optical spectra; Energy loss spectra; and Superconductivity.

DESCRIPTORS: (U) *EXCITONS, *SUPERCONDUCTIVITY, BANDS(STRIPS), CONDUCTIVITY, COPPER, D BAND, DIELECTRICS, DYNAMIC RESPONSE, ELECTRON ENERGY, ELECTRONS, ENERGY, INTERACTIONS, LOSSES, MATERIALS, NARROWBAND, RESONANCE, RESPONSE, SPECTRA, TRANSITION METALS, TRANSITION TEMPERATURE, VISIBLE SPECTRA

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A6

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

AD-A160 304 20/4

PHYSICAL DYNAMICS INC BELLEVUE WA

(U) Exponential Bound for Error Probability in NN-Discrimination.

(U) Experimental Generation of Stratified Shear Flows.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-14 Mar 85,

APR 85 23P

AUG 85 30P

PERSONAL AUTHORS: Bal,Z. D. ;

PERSONAL AUTHORS: Delisi,D. P. ;

REPORT NO. TR-85-15

REPORT NO. PD-NW-85-340R

CONTRACT NO. F49620-85-C-0008

CONTRACT NO. F49620-84-C-0092

PROJECT NO. 2304

PROJECT NO. 3005

TASK NO. A5

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0823

TR-85-0873

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Let (θ, X) be a $(1, 2, \dots, s) \times R$ to the d power-valued random vector and $(\theta \text{ sub } 1, x \text{ sub } 1) \dots (\theta \text{ sub } n, x \text{ sub } n)$ be iid. samples drawn from (θ, X) . The so-called discrimination problem is to find a function of X , usually depending upon $(\theta \text{ sub } n, x \text{ sub } n) \dots (\theta \text{ sub } 1, x \text{ sub } 1)$, which is used to predict the value of θ . One of the most frequently used approaches is the nearest neighbor discrimination rule. Keywords: population(mathematics); and random variables.

DESCRIPTORS: (U) *DISCRIMINATE ANALYSIS, *EXPONENTIAL FUNCTIONS, POPULATION(MATHEMATICS), ERRORS, PROBABILITY, DISCRIMINATION, RANDOM VARIABLES

IDENTIFIERS: (U) Nearest neighbor discrimination rule, PE61102F, WUAFOSR2304A5

ABSTRACT: (U) An annular, stratified flow tank was designed and built to study gravity wave, mean flow (critical layer) interactions. The tank contained stratified salt water, and an initial shear profile was generated by blowing air over the water surface. Internal gravity waves were generated by displacing the bottom floor of the tank in a known way. A preliminary critical layer experiment was performed to prove the feasibility of studying critical layer interactions in the experimental facility. Quantitative measurements of mean flow velocities, velocity perturbations, and vertical wavelenghts were obtained. Keywords: Critical layers; Stratified; Shear Flow; Gravity waves.

DESCRIPTORS: (U) *GRAVITY WAVES, *SHEAR PROPERTIES, *FLUID FLOW, CRITICALITY(GENERAL), FLOORS, FLOW, FREQUENCY, INTERACTIONS, INTERNAL WAVES, FLOW RATE, TANKS(CONTAINERS), LAYERS, MEAN, MEASUREMENT, PERTURBATIONS, AIR FLOW, BOTTOM, STRATIFICATION, SURFACES, VELOCITY, VERTICAL ORIENTATION, WATER

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 302 12/1

SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND STATISTICS

(U) On the Asymptotic Properties of a Kernel-Type Quantile Estimator from Censored Samples.

DESCRIPTIVE NOTE: Technical rept..

MAY 85 17P

PERSONAL AUTHORS: Lio, Y. O. ; Padgett, W. J. ; Yu, K. F. ;

REPORT NO. TR-104

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0865

UNCLASSIFIED REPORT

ABSTRACT: (U) In reliability and medical studies, it is often of interest to estimate various quantiles of the unknown lifetime distribution. In particular, the median lifetime and extreme quantiles are of interest to the experimenter in such studies. In many life testing and medical follow-up experiments, however, arbitrarily right-censored data arise, and it is important to be able to estimate the quantiles of interest based on the censored data. For such data, some kernel-type quantile estimators are considered in this paper which give smoother estimates than the usual product-limit quantile function. Keywords: Random right-censorship; Kernel estimation; Product-limit quantile function; Asymptotic normality; and Mean-square convergence.

DESCRIPTORS: (U) *ASYMPTOTIC NORMALITY, *STATISTICAL DATA, ASYMPTOTIC SERIES, DISTRIBUTION, ESTIMATES, LIFE SPAN(BIOLOGY), LIFE TESTS, MEDICINE, RELIABILITY, STATISTICAL SAMPLES, KERNEL FUNCTIONS, CENSORSHIP

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Differential Metrics in Probability Spaces Based on Entropy and Divergence Measures.

DESCRIPTIVE NOTE: Technical rept..

APR 85 23P

PERSONAL AUTHORS: Rao, C. R. ;

REPORT NO. TR-85-08

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0864

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper discussed some general methods of metrizing probability spaces through the introduction of a quadratic differential metric in the parameter manifold of a set of probability distributions. These methods extend the investigation made in Rao (1945) where the Fisher information matrix was used to construct the metric, and the geodesic distance was suggested as a measurement of dissimilarity between probability distributions. The basic approach in this paper is first to construct a divergence or a dissimilarity measure between any two probability distributions, and use it to derive a differential metric by considering two distributions whose characterizing parameters are close to each other. One measure of divergence considered is the Jensen difference based on an entropy functional as defined in Rao (1982). Another is the f-divergence measure studied by Csizsar. The latter class leads to the differential metric based on the Fisher information matrix. The geodesic distances based on this metric computed by various authors are listed. Additional keywords: Cross entropy; Quadratic entropy.

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, *METRIC SYSTEM, DISTRIBUTION, ENTROPY, GEODESICS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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PARAMETERS, PROBABILITY, QUADRATIC EQUATIONS,
RANGE (DISTANCE)

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) Fisher information matrix, Jensen
difference

(U) Hermitian and Nonnegativity Preserving Subspaces.
DESCRIPTIVE NOTE: Technical rept..

JUL 85 15P

PERSONAL AUTHORS: Mathew, T. ;

REPORT NO. TR-85-25

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0751

UNCLASSIFIED REPORT

ABSTRACT: (U) The concepts of Hermitian preserving and nonnegativity preserving subspace of complex square matrices are introduced. Characterizations of such subspaces are obtained and applications are discussed. Keywords: Hermitian preserving subspace; symmetry preserving subspace; nonnegativity preserving subspace.

DESCRIPTORS: (U) *MATRICES(MATHEMATICS), SYMMETRY, PRESERVATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 289 9/2

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) SPADE (Series Parallel) Directed Acyclic Graph Evaluator): A Tool for Performance and Reliability Evaluation. Revision.

JUL 85 30P

PERSONAL AUTHORS: Sahner, R. A.; Trivedi, K. S.;

REPORT NO. CS-1984-15

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-85-0745

UNCLASSIFIED REPORT

ABSTRACT: (U) A model for the stochastic analysis of directed acyclic graphs is developed. These graphs represent event-precedence networks where the distribution function associated with and event is assumed to be a variant of the phase-type distribution. Events may occur sequentially, probabilistically, or concurrently. The distribution function of the graph execution time is computed in a semi-symbolic form. Applications of the model for the evaluation of concurrent program execution time and to the reliability analysis of fault-tolerant systems are discussed. Additional keywords: SPADE Computer program; SPADE (Series Parallel Directed Acyclic Graph Evaluator).

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *COMPUTER PROGRAMS, COMPUTATIONS, COMPUTERIZED SIMULATION, MODELS, FAULT TOLERANT COMPUTING, SHOVELS, DISTRIBUTION FUNCTIONS, GRAPHS, TIME, RELIABILITY, TEST AND EVALUATION

IDENTIFIERS: (U) SPADE computer program, SPADE (Series Parallel Directed Acyclic Graph Evaluator), PE61102F, WUAFOSR2304K3

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UNCLASSIFIED

AD-A160 287 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Role of Auxiliary Variate and Additional Data in Density Estimation.

DESCRIPTIVE NOTE: Technical rept..

MAY 85 33P

PERSONAL AUTHORS: Ahmad, M.; Singh, R. S.;

REPORT NO. TR-85-21

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0748

UNCLASSIFIED REPORT

ABSTRACT: (U) Some new estimators of a univariate probability density function $f(y)$ of a random variable Y , based on a set of observations taken from a bivariate joint density $\beta(x,y)$ of Y and a suitably chosen concomitant variable X , have been investigated. Asymptotic unbiasedness, mean square consistency, asymptotic normality and rates of convergence have been established. A related problem of estimation of a conditional density has also been studied. Keywords: Kernel Method; Unbiasedness; Mean Square Consistencies; Rate of Convergence.

DESCRIPTORS: (U) *ESTIMATES, *PROBABILITY DENSITY FUNCTIONS, ASYMPTOTIC NORMALITY, CONSISTENCY, ESTIMATES, MEAN, OBSERVATION, RATES, DENSITY, CONVERGENCE, RANDOM VARIABLES, BIVARIATE DENSITY FUNCTIONS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 286 12/1

DUKE UNIV DURHAM NC

(U) An Aggregation Technique for the Transient Analysis of Stiff Markov Systems.

DESCRIPTIVE NOTE: Interim rept..

JUL 85 34P

PERSONAL AUTHORS: Trivedi, K. S. ;

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-85-0744

UNCLASSIFIED REPORT

ABSTRACT: (U) An approximation algorithm for systematically converting a stiff Markov chain onto a non-stiff chain defined over a smaller state space is given. The algorithm unifies and extends earlier approaches to the problem in the context of transient analysis. The algorithm is illustrated using two examples. Additional keywords: reliability models; queueing theory.

DESCRIPTORS: (U) *QUEUEING THEORY, *MARKOV PROCESSES, ALGORITHMS, TRANSIENTS, MODELS, RELIABILITY, STIFFNESS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304K3

AD-A160 277 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Covariate Measurement Error in Logistic Regression.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85,

APR 85 27P

PERSONAL AUTHORS: Stefanski, L. A. ; Carroll, R. J. ;

CONTRACT NO. F49620-82-C-0009, AFOSR-80-0080

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0867

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Cornell Univ., Ithaca, NY. Dept. of Economic and Social Statistics.

ABSTRACT: (U) In a logistic regression model when covariates are subject to measurement error the naive estimator, obtained by regressing on the observed covariates, is asymptotically biased. This document introduces a bias-adjusted estimator and two estimators appropriate for normally distributed measurement errors; a functional maximum likelihood estimator and an estimator which exploits the consequences of sufficiency. The four proposals are studied asymptotically under conditions which are appropriate when the measurement error is small. A small Monte-Carlo study illustrates the superiority of the measurement-error estimators in certain situations. Additional keywords: mathematical models.

DESCRIPTORS: (U) *ESTIMATES, *COVARIANCE, *MATHEMATICAL MODELS, NORMAL DISTRIBUTION, BIAS, ASYMPTOTIC NORMALITY, ERRORS, MEASUREMENT, LOGISTICS, REGRESSION ANALYSIS, MONTE CARLO METHOD, MAXIMUM LIKELIHOOD ESTIMATION

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Rotational Assignment Using Phase Relationships in
Optical-Optical Double Resonance. The BaI C2II-X2
sigma + System.

MAY 85 14P

PERSONAL AUTHORS: Johnson, M. A. ;Zare, R. N. ;

CONTRACT NO. F49620-83-C-0033

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-85-0851

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Chemical Physics,
v82 n10 p4449-4459, 15 May 85.

ABSTRACT: (U) We describe an optical-optical double resonance scheme in which a lower vibration-rotation level is labeled. One laser is fixed in frequency and probes the population of the labeled level via the resulting laser-induced fluorescence; a second laser is scanned in frequency through the same vibronic band excited by the probe. A double resonance signal results when the population in the labeled level is either increased or decreased by the action of the second laser. The positions and phase pattern of the double resonance spectrum reveal the J numbering of the labeled level and permit a good approximation to be made for the upper and lower state rotational constants. This information allows the J value of the labeled level to be systematically changed, permitting the spectrum to be unraveled. This technique is proven by applying it to the highly congested C-X spectrum of the BaI molecule, for which no rotational information was previously available for any of its states. (Reprints)

DESCRIPTORS: (U) *MOLECULAR VIBRATION, *RESONANCE RADIATION, LASER INDUCED FLUORESCENCE, LASERS, PATTERNS, POPULATION, REPRINTS, SPECTRA, BARIUM HALIDES, MOLECULAR ROTATION, RESONANCE, IODIDES

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MASSACHUSETTS INST OF TECH
NEUROENDOCRINE REGULATION

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Use of Tyrosine or Foods to Amplify Catecholamine
Release.

(U) New Measures of Diversity.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Interim technical rept. 30 Sep 83-29
Sep 84.

JUN 85 25P

JUN 85 13P

PERSONAL AUTHORS: Ahmad, M. ;

PERSONAL AUTHORS: Murtman, R. J. ;

REPORT NO. TR-85-23

CONTRACT NO. AFOSR-83-0368

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2312

PROJECT NO. 2304

TASK NO. A1

TASK NO. A5

MONITOR: AFOSR
TR-85-0742

MONITOR: AFOSR
TR-85-0748

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental system using rat caudate
slices was used to measure the effects of tyrosine on
neuronal activity. Studies demonstrated the importance of
adequate tyrosine in sustaining dopamine release and
provide the first evidence that when sufficient
experimental tyrosine is not provided, its level within
catecholaminergic nerve terminals actually decline. The
data suggest that when a group of such neurons undergoes
sustained activity, its requirements for tyrosine
increase dramatically. In such circumstances, normal
levels of plasma tyrosine may be in adequate to sustain
function. (Author)

DESCRIPTORS: (U) *CATECHOLAMINES, *TYROSINE, *DOPAMINE,
RELEASE, FOOD, NERVE CELLS, MOTOR NEURONS,
PLASMAS(PHYSICS)

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1

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ABSTRACT: (U) The problem of measuring diversity within
populations and dissimilarity or similarity between
populations has been extensively treated in the
literature. Diversity within populations and
dissimilarity between populations have been measured and
interpreted differently. The choice of a diversity
measure essentially depends on the context of a problem,
however any diversity measure satisfying certain basic
conditions can be used for partitioning the total
variability into a number of additive components, each of
which can be used to test a certain null hypothesis or
estimate a component of the variability. Rao outlined a
general procedure called Analysis of Diversity which is
similar to the Analysis of Variance for quantitative data.
In this direction Light and Margolin Anderson and Landis
have studied the Gini-Simpson index of diversity while
Nayak has extended their results for Quadratic Entropy
introduced by Rao. This paper proposes three new measures
of diversity and study related inference problems.
Additional keywords: Concavity; Convexity; Computations.

DESCRIPTORS: (U) *COMPUTATIONS, *POPULATION(MATHEMATICS),
*ANALYSIS OF VARIANCE, HYPOTHESES, NULLS(AMPLITUDE),
POPULATION, MEASUREMENT, COMPARISON, CONVEX SETS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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IDENTIFIERS: (U) *Analysis of Diversity, Concavity,
PE61102F, WJAFOSR2304A5

NORTH DAKOTA STATE UNIV FARGO DEPT OF ZOOLOGY

(U) Identification and Quantification of the Water-Soluble
Components of JP-4 and a Determination of Their
Biological Effects upon Selected Freshwater Organisms.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 78-27 Feb
84.

JUL 85 14P

PERSONAL AUTHORS: Brammer, J. D. ; Puyear, R. L. ;

CONTRACT NO. AFOSR-78-3709

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-85-0743

UNCLASSIFIED REPORT

ABSTRACT: (U) This final technical report includes a brief summary of research performed, results obtained, graduate students supported and theses written. One paper published was of a technical nature and describes the use of reverse-phase C-18 minicolumns for concentrating water soluble hydrocarbons derived from JP-4 jet fuel. Another technical paper using the same technique as the first was used to concentrate water soluble hydrocarbons produced by running an outboard motor in water. Analytical methods used for hydrocarbon separation and identification was GC, GC/MS and HPLC. The toxicity of toluene on the fathead minnow was the basis of three papers and a Ph.D. thesis. It was found that the embryo was as sensitive to toluene than was the protelarvae or adult fish. This was determined using 96-hr LC50 tests. An MS thesis was written on the effects of toluene on gill structure in the fathead minnow adult. Little effect of toluene on gill structure was noted. A comparative study on the effects of administration of benzene, toluene and xylene isomers on their in vitro metabolism and various drug metabolizing enzymes in rat liver, and the covalent binding of toluene to rat liver microsomes has resulted in one Ph.D. thesis and the preparation of three manuscripts for publication. Originator supplied keywords

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include: Enzyme induction; Cytochrome P-450; Mixed function oxidase; Conjugation; Cytochrome c reductase; Microsomes; Bluegill sunfish.

DESCRIPTORS: (U) *ANALYTICAL CHEMISTRY, *FISHES, *HYDROCARBONS, *TOXICITY, JET ENGINE FUELS, MARINE ENGINES, ENVIRONMENTAL IMPACT, WATER SOLUBLE MATERIALS, ADULTS, RESPONSE(BIOLOGY), CONCENTRATION(COMPOSITION), WATER, EMBRYOS, ENZYMES, BENZENE, COVALENT BONDS, MINNOWS, FRESH WATER, FISH GILLS, IN VITRO ANALYSIS, METABOLISM, LIVER, MICROSOMES, RATS, DOCUMENTS, TOLUENES, WATER, XYLENES, MICROORGANISMS, HYDROCARBONS, SEPARATION, MICROSOMES, SENSITIVITY, THESES, SOLUBILITY

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5

AD-A160 267 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Modified Nonparametric Kernel Estimates of a Regression Function and their Consistencies with Rates.

DESCRIPTIVE NOTE: Technical rept.,

APR 85 28P

PERSONAL AUTHORS: Singh, R. S. ; Ahmad, M. ;

REPORT NO. TR-85-12

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0857

UNCLASSIFIED REPORT

ABSTRACT: (U) The theory of regression is concerned with the prediction of the value of a variable, called the response or dependent variable, at a given value of another (correlated) variable, called the predictor or independent variable. Prediction is needed in several practical situations. For example, an agriculturist wants to know the yield of wheat at an amount of a specified fertilizer, a meteorologist wants to forecast weather several hours ahead on the basis of previous atmospheric measurements and a physician is interested in determining the weight of a patient in terms of the number of weeks he or she has been on a diet. In this document, two sets of modified kernel estimates of a regression function are proposed: one when a bound on the regression function is known and the other when nothing of this sort is at hand. Explicit bounds on the mean square errors of the estimators are obtained. Pointwise as well as uniform consistency in mean square and consistency in probability of the estimators are proved. Speed of convergence in each case is investigated.

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, *MATHEMATICAL PREDICTION, *REGRESSION ANALYSIS, DIET, ESTIMATES, MEAN, PHYSICIANS, CONVERGENCE, VELOCITY.

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CONSISTENCY, METEOROLOGISTS, PREDICTIONS, THEORY, WHEAT,
YIELD, FUNCTIONS(MATHEMATICS), KERNEL FUNCTIONS,
VARIABLES, WEATHER FORECASTING, BODY WEIGHT, PATIENTS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Principal Component Analysis Under Correlated
Multivariate Regression Equations Model.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

DESCRIPTIVE NOTE: Technical rept.,

APR 85 30P

PERSONAL AUTHORS: Krishnaiah,P. R. ;Sarkar,S. ;

REPORT NO. TR-85-09

CONTRACT NO. F49620-85-C-0008, F49620-82-K-0001

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0855

UNCLASSIFIED REPORT

ABSTRACT: (U) The motivation behind the study in this paper is to derive some asymptotic results useful in the area of principal component analysis under the CMRE model. The object of the principal component analysis is to select a small number of important linear combinations of the variables which will best describe the variation among experimental units. In this paper, the authors consider the problem of testing for the equality of the last few eigenvalues of the covariance matrix under correlated multivariate regression equations models. Asymptotic distributions of various test statistics are derived when the underlying distribution is multivariate normal. Some of the distribution theory is extended to the case when the underlying distribution is elliptically symmetric.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *MULTIVARIATE ANALYSIS, COVARIANCE, NORMAL DISTRIBUTION, EIGENVALUES, MATRICES(MATHEMATICS), SYMMETRY, COMBINATORIAL ANALYSIS, LINEARITY, ASYMPTOTIC SERIES, EQUATIONS, REGRESSION ANALYSIS, DISTRIBUTION THEORY, STATISTICAL TESTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

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MASSACHUSETTS UNIV AMHERST DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING PROCESSING, DYNAMIC TESTS, STRATEGY, HOMOGENEITY, TEST
METHODS

(U) Dynamic Testing Strategy for Distributed Systems. IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

JUN 85 9P

PERSONAL AUTHORS: Meyer, F. J. ; Pradhan, D. K. ;

CONTRACT NO. AFOSR-84-0052

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0839

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Annual
International Symposium on Fault-Tolerant Computing (15th)
, p84-90 21 Jun 85.

ABSTRACT: (U) Testing and diagnosis is an important consideration in the implementation of fault-tolerant distributed systems. This reprint treats fault diagnosis as two distinct processes: fault discovery and dissemination of diagnostic information. The corresponding testing overhead consists of periodic tests for fault discovery and further tests and/or message passing for dissemination of diagnostic information. Both homogeneous and nonhomogeneous systems in both synchronous and asynchronous environments are discussed. Previous research derived precisely when a given set of tests in a homogeneous system can achieve a specified level of self-diagnosability. A new methodology is presented with the objective of minimizing the overhead associated with periodic testing. Minimizing periodic testing allows less testing overhead, greater test reliability, and/or more frequent testing. The method diagnoses up to t faults, where t is the fault-tolerance of the system (t is one less than the conductivity of the communication graph).

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS,
*FAULT TOLERANT COMPUTING, GRAPHS, DISTRIBUTION,
METHODOLOGY, FAULTS, DIAGNOSIS(GENERAL), INFORMATION

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AD-A180 255 12/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Decoupled Delay Estimation in the Identification of Differential Delay Systems,

84 13P

PERSONAL AUTHORS: Pearson, A. E. ; Wu, C. Y. ;

CONTRACT NO. AFOSR-82-0230

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0780

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v20 n8 p761-772
1984.

ABSTRACT: (U) Based on the variable projection functional in nonlinear least-squares theory, the estimation of pure time delay is decoupled from the determination of the remaining system parameters for a class of differential delay models. The approach utilizes input output data on a fixed finite time interval and avoids estimating unknown initial conditions. Results of a simulation study are summarized for several examples. Keywords include: Parameter estimation; System identification; Time-lag systems. (Reprints)

DESCRIPTORS: (U) *TIME LAG THEORY, *ESTIMATES, IDENTIFICATION, INPUT OUTPUT PROCESSING, LEAST SQUARES METHOD, MODELS, NONLINEAR SYSTEMS, DELAY, PARAMETERS, REPRINTS, SIMULATION, THEORY, TIME INTERVALS, VARIABLES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

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TEXAS UNIV AT AUSTIN LAB FOR IMAGE AND SIGNAL ANALYSIS

(U) Final Scientific Report on Contract F49620-83-K-0013.

DESCRIPTIVE NOTE: Final rept. 1 Dec 82-31 Jan 85,

JAN 85 31P

PERSONAL AUTHORS: Aggarwal, J. K. ;

CONTRACT NO. F49620-83-K-0013

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR
TR-85-0824

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The Laboratory for Image and Signal Analysis conducts a broad program of research in computer vision, image processing and architectures for image processing. During the period of this report, several projects were completed including those on positioning and tracking of objects moving in space, parallel image processing, 3-D representation and recognition from range data and a normalized quadtree representation. A new approach to the problem of tracking of objects in space is formulated which is significantly simpler and robust in solution. Previously available quadtree description of objects is modified to develop a new description called normalized quadtree representation. This representation is found to be compact as well as useful recognition of objects. A methodology for analysis of architectures for parallel image processing is proposed. Our research advocates an application-drive approach for using parallel architectures for image processing. Keywords include: Parallel Image Processing; Motion Parameters; 3-D Representation; and Recognition from Range Data.

DESCRIPTORS: (U) *IMAGE PROCESSING, *COMPUTER GRAPHICS, *RESEARCH MANAGEMENT, RECOGNITION, TRACKING, COMPUTERS, VISION, MOTION, PARAMETERS, PARALLEL PROCESSING, SIGNALS, COMPUTER ARCHITECTURE, THREE DIMENSIONAL

IDENTIFIERS: (U) Computer vision, WUAFOSR2305BC,

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AD-A160 247 12/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Estimating Target Acceleration in Intercept Problems
Using Modal Equation Errors.

DEC 83 3P

PERSONAL AUTHORS: Pearson, A. E. ; Ezzio, L. A. ;

CONTRACT NO. AFOSR-82-0230, NSF-ECS81-11219

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0779

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Conference on Decision
and Control, n22 p557-558 Dec 83.

ABSTRACT: (U) With the equation error modeled by
arbitrary linear combinations of modal functions, the
least squares estimation of the target acceleration for a
two dimensional intercept problem is obtained by one
dimensional minimization of approximately derived
variable projection functionals over short time intervals.
Additional keywords: Kinetic equations; Differential
equations; Matrices(Mathematics); and Reprints.

DESCRIPTORS: (U) *ESTIMATES, *LEAST SQUARES METHOD,
*MOVING TARGETS, VARIABLES, VARIABLES, EQUATIONS, ERRORS, KINETICS,
REPRINTS, ACCELERATION, TARGETS, DIFFERENTIAL EQUATIONS,
INTERCEPTION, FUNCTIONS, SHORT RANGE(TIME), TIME
INTERVALS, TWO DIMENSIONAL, MATRICES(MATHEMATICS),
LINEARITY, ONE DIMENSIONAL

IDENTIFIERS: (U) *Target acceleration, WUAFOSR2304A1,
PE61102F

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AD-A160 238 12/1

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

NORTHWESTERN UNIV EVANSTON IL

(U) Parallel Matrix Computations.

(U) Markov Processes Applied to Control, Replacement, and Signal Analysis.

DESCRIPTIVE NOTE: Interim rept. Apr 84-Apr 85,

DESCRIPTIVE NOTE: Progress rept. 1 Jun 83-31 May 84,

APR 85 14P

APR 85 8P

PERSONAL AUTHORS: Stewart, G. W. ; O'Leary, D. P. ;

PERSONAL AUTHORS: Cinlar, E. ;

CONTRACT NO. AFOSR-82-0078

CONTRACT NO. AFOSR-82-0189

PROJECT NO. 2304

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0820

TASK NO. A5

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-85-0832

ABSTRACT: (U) This project concerns the design and analysis of algorithms to be run in a processor-rich environment. It focuses primarily on algorithms that require no global control and that can be run on systems with only local connections among processors. The properties of these algorithms both theoretically and experimentally are investigated. The experimental work is done on the ZMOB, a working parallel computer operated by the Laboratory for Parallel Computation of the Computer Science Department at the University of Maryland. The emphasis is on two areas: 1) Dense problems from numerical linear algebra; and 2) The iterative and direct solution of sparse linear systems. Additional keywords: parallel algorithms; and software development.

UNCLASSIFIED REPORT

ABSTRACT: (U) This is an account of the work accomplished between 1 June 1983 and 31 May 1984. Work is reported on eight topics: deformation of solids, reliability, seminar on stochastic processes, text on stochastic processes, stability of dependent random variables, mean exit time of Brownian motion with drift, harmonic measure of a small geodesic sphere, and mean exit time for a tubular neighborhood. Keywords include: Deformation of solids; stochastic processes; stability of dependent random variables; mean exit time; and harmonic measure of small Geodesic sphere.

DESCRIPTORS: (U) *COMPUTATIONS, *ALGORITHMS, *PARALLEL PROCESSING, HIGH DENSITY, ITERATIONS, SOLUTIONS(GENERAL), LINEAR ALGEBRA, NUMERICAL ANALYSIS, PARALLEL ORIENTATION, LINEAR SYSTEMS, SPARSE MATRIX, COMPUTERS, CONTROL, GLOBAL, MARYLAND, COMPUTER PROGRAMS, PARALLEL PROCESSORS, MATRICES(MATHEMATICS)

DESCRIPTORS: (U) *MARKOV PROCESSES, *STOCHASTIC PROCESSES, *RANDOM VARIABLES, DEFORMATION, SOLIDS, DRIFT, RELIABILITY, SIGNALS, HARMONICS, EXITS, MEAN, TIME, STOCHASTIC PROCESSES, SYMPOSIA, GEODESICS, SPHERES, BROWNIAN MOTION

IDENTIFIERS: (U) PE61102F

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

KINETICS, *DENSE GASES, IONS, MASS, MATHEMATICAL ANALYSIS, ENERGY LEVELS, DISSOCIATION, MICROSCOPY, ION ION INTERACTIONS, TIME DEPENDENCE, VARIATIONAL PRINCIPLES

(U) Association/Dissociation Processes in Dense Gases.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 84-30 Jun 85,

IDENTIFIERS: (U) Debye Smoluchowski equation, WUAFOSR2301A4, PE61102F

AUG 85 81P

PERSONAL AUTHORS: Flannery, M. R. ;

REPORT NO. GIT-85-001

CONTRACT NO. AFOSR-84-0233

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR TR-85-0793

UNCLASSIFIED REPORT

ABSTRACT: (U) A new basic microscopic theory of association/dissociation processes in dense gases has been developed. Expressions for the time-dependent rates R (subscript A, D)(t) for the association/dissociation of atomic or molecular species A and B in a gas M are formulated in terms of the net probability P sub i (superscript A, D) for association/dissociation of bound energy level i of the pair (A-B). A new Variational principle for these rates is proposed and is applied to ion-ion recombination, as a benchmark, with very successful results. The diffusional theory is examined and it is shown that highly accurate results can be obtained for general mass systems provided the new basic expression introduced here for R (sub (A,D))(t) is adopted. The microscopic basis of the macroscopic Debye-Smoluchowski Equation (DSE) is examined and analytical expressions for rates are derived for general interactions between A and B. A valuable relationship between the rates of recombination appropriate to the cases of ions generated with uniform frequency within a reaction volume and ions which approach each other from infinite separation is derived.

DESCRIPTORS: (U) *RECOMBINATION REACTIONS, *REACTION

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DTIC REPORT BIBLIOGRAPHY . SEARCH CONTROL NO. EVK15N

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AD-A160 234 9/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) The Amount of Noise Inherent in Bandwidth Selection for a Kernel Density Estimator.

(U) Reliability Evaluation of Fault-Tolerant Multiprocessor Systems.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

DESCRIPTIVE NOTE: Interim rept..

MAY 85 31P

MAY 85 8P

PERSONAL AUTHORS: Hall, P. ; Marron, J. S. ;

PERSONAL AUTHORS: Trivedi, K. S. ;

REPORT NO. TR-100

CONTRACT NO. AFOSR-84-0132

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR TR-85-0783

MONITOR: AFOSR TR-85-0631

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Any practical method of constructing a bandwidth must depend only on a statistical sample, and should produce some sort of estimate of this bandwidth. The purpose of this paper is to show that there a well-defined limits to the accuracy of all data-driven bandwidth estimates. Put another way, there is an unbridgeable gap between the minimum integrated square error attained using a optimal bandwidth and the minimum achievable integrated square error using a data-driven bandwidth estimate. Additional keywords: stochastic processes; cross validation; and random variables.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *KERNEL FUNCTIONS, *RANDOM VARIABLES, ACCURACY, ERRORS, INTEGRATED SYSTEMS, BANDWIDTH, OPTIMIZATION, SELECTION, DENSITY, ESTIMATES, LIMITATIONS

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5

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ABSTRACT: (U) The major issues involved in modeling modern computer systems can be broadly classified into those arising from the model construction, model reduction and solution, and in the interpretation of the model solution. Modeling languages such as fault trees, the PMS notation, and Extended Stochastic Petri Nets can be valuable in simplifying the task of model construction. The goal of the languages is to provide well defined constructs to the user and let the modeling package automatically generate the details of the underlying stochastic model. The language constructs should correspond closely to the system constructs, and yet should produce a concise representation. Specifying the relevant details of the system being modeled can require a tremendous number of states to be considered (in excess of 100,000). Techniques must be developed to reduce the model to one that is computationally tractable, and then to solve the reduced model in a computationally efficient manner. Once the solution is obtained, it must be interpreted carefully. The errors introduced by the model reduction step and in the solutions must be bounded, and sensitivity of the solution with respect to input parameters should be estimated. (Author)

DESCRIPTORS: (U) *FAULT TOLERANT COMPUTING, *MULTIPROCESSORS, COMPUTERS, MODELS, REDUCTION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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SENSITIVITY, SOLUTIONS(GENERAL), CONSTRUCTION, FAULT TREES, RELIABILITY, MATHEMATICAL MODELS, STOCHASTIC PROCESSES

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS
(U) Spectra for Large Dimensional Random Matrices.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 14P

PERSONAL AUTHORS: Yin, Y. Q.; Bai, Z. D.;

REPORT NO. TR-85-17

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0861

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors reviewed some recent developments in the area of large dimensional random matrices. Additional keywords: Eigenvalues; Limiting spectral distribution; Multivariate analysis; Matrices(Mathematics). (Author)

DESCRIPTORS: (U) *MATRICES(MATHEMATICS), EIGENVALUES, MULTIVARIATE ANALYSIS, LIMITATIONS, SPECTRAL ENERGY DISTRIBUTION

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) On Structure Determination for Polynomial Input-Output Differential Systems,

MAR 85 10P

PERSONAL AUTHORS: Pearson, A. E. ;

CONTRACT NO. AFOSR-82-0230

PROJECT NO. 2304

TASK NO. A

MONITOR: AFOSR
TR-85-0781

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of structure determination for a deterministic class of polynomial input-output differential systems is formulated as a minimum norm-discrete time optimal control problem. The order of the differential equation and the degrees of the polynomials involving the input-output variables play the role of multiple discrete-times while the coefficient parameters play the role of a discrete control variable. The basis of the parameter identification techniques is Shinbrot's method of moment functionals using linear combinations of commensurable sinusoids as the modulating functions. Given the system input-output data on a finite time interval, the underlying computations involve calculating a finite set of Fourier series coefficients or moments formed from the data, which can be efficiently carried out via an FFT algorithm, followed by a sequence of singularity tests performed on a controllability type Gram determinant that arises for the formulation.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *FOURIER ANALYSIS, ALGORITHMS, COMPUTATIONS, DETERMINATION, PARAMETERS, DETERMINANTS(MATHEMATICS), FOURIER SERIES, IDENTIFICATION, PARAMETERS, STRUCTURAL PROPERTIES, INPUT OUTPUT MODELS, METHOD OF MOMENTS, FAST FOURIER TRANSFORMS

IDENTIFIERS: (U) Shinbrot method

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BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Parameter Identification for a Class of Polynomial Differential Systems,

DEC 84 5P

PERSONAL AUTHORS: Pearson, A. E. ; Lee, F. C. ;

CONTRACT NO. AFOSR-82-0230

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0782

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Decision and Control (23rd) p359-362 Dec 84.

ABSTRACT: (U) A least squares parameter identification technique is developed for a class of nonlinear deterministic systems modeled by polynomial input-output differential equations. The basis to the technique is Shinbrot's method of moment functionals using trigonometric modulating functions. Given the input-output data over sequential time intervals, the underlying computations utilize a Fast Fourier Transform algorithm on polynomials of the data without the need for estimating unknown initial conditions at the start of each finite time interval. Keywords Reprints. (Author)

DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, *LEAST SQUARES METHOD, SEQUENCES(MATHEMATICS), METHOD OF MOMENTS, DIFFERENTIAL EQUATIONS, FUNCTIONS(MATHEMATICS), COMPUTATIONS, REPRINTS, IDENTIFICATION, PARAMETERS, TIME INTERVALS, ALGORITHMS, FAST FOURIER TRANSFORMS, DETERMINANTS(MATHEMATICS), NONLINEAR SYSTEMS, POLYNOMIALS, MODULATION, TRIGONOMETRY

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 214 12/1

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) Structural Properties of Randomized Times.

DESCRIPTIVE NOTE: Interim rept..

DEC 84 37P

PERSONAL AUTHORS: Karr, A. F. ; Pittenger, A. O. ;

REPORT NO. TR-421

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0814

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Maryland Univ. Baltimore. Dept. of Mathematics and Computer Science.

ABSTRACT: (U) Suppose a measure μ dominated a measure η in the ordering induced by the excessive functions of a transient Markov process. Rost shows that η can be represented as the distribution of the process stopped at a randomized optional time and started with initial distribution μ . This paper introduces the shift operator to the class of randomized optional times, including the class of randomized quasi-terminal times and that of randomized terminal times. It analyzes the algebraic properties of these classes and obtain some compactness results for the class of randomized quasi-terminal times. Some applications, including rempiassage by hitting times are presented. (Author)

DESCRIPTORS: (U) *MARKOV PROCESSES, SHIFTING, TRANSIENTS, STRUCTURAL PROPERTIES, OPERATORS(MATHEMATICS)

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5

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TEXAS UNIV AT AUSTIN

(U) On the Optimality of Data Processors for Signal Detection Over a Class of Contaminated Noises.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 80-30 Sep 85,

MAY 85 7P

PERSONAL AUTHORS: Halverson, D. R. ; Wise, G. L. ;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0775

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the Annual Conference on Communication, Control, and Computing 2(nd) Monticello, IL 3-5 Oct 84.

ABSTRACT: (U) We consider the effect induced on the data processor of a signal detection system when the underlying noise distribution functions are varied about their nominal values. We first consider the detection of a time varying deterministic signal in additive noise, and then extend our results to a more general situation in which the signal possesses a random amplitude. Our results characterize a class of contaminants of an arbitrary nominal distribution over which the data processor can be designed using the nominal distribution, and it is seen, for example, that such a class can contain distribution functions which can differ greatly from the nominal distribution. Keywords include: signal detection, likelihood ratio, and optimal detection.

DESCRIPTORS: (U) *DATA PROCESSING EQUIPMENT, *DETECTION, *NOISE, *DISTRIBUTION FUNCTIONS, *DETECTORS, CONTAMINANTS, OPTIMIZATION, DETECTION, SIGNALS, DETERMINANTS(MATHEMATICS), TIME SIGNALS, AMPLITUDE

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A160 211 4/2 17/9

NORTHWESTERN UNIV EVANSTON IL

CORNELL UNIV ITHACA NY SCHOOL OF ELECTRICAL ENGINEERING

(U) Markov Processes Applied to Control, Replacement, and Signal Analysis.

(U) Frontal Passage Data from the SOUSY-VHF-Radar.

DESCRIPTIVE NOTE: Interim progress rept. 1 Jun 83-31 Dec 84.

DESCRIPTIVE NOTE: Final rept. 1 Mar 83-28 Feb 85

AUG 85 61P

APR 85 4P

PERSONAL AUTHORS: Farley, D. T. ;

PERSONAL AUTHORS: Cinlar, E. ;

CONTRACT NO. AFOSR-83-0100

CONTRACT NO. AFOSR-82-0189

PROJECT NO. 2310

TASK NO. A5

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0852

MONITOR: AFOSR
TR-85-0828

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Much of the work has been of an exploratory nature. The main thrust has been on the reliability of complex devices, on the problems of fatigue and fracture, and on the stochastic shapes that arise in manufacturing cylinders and spheres. Keywords include: Reliability of complex devices; random shapes; and deformation of solids.

ABSTRACT: (U) Experiments have shown that there may be advantages in using a spaced antenna method instead of a Doppler method for measuring wind profiles, particularly for systems with small dimensions of the type likely to be used in operational wind profiling. The comparison between radar and radiosonde data have shown good agreement, indicating that the features seen in the radar reflectivity data are characteristic of frontal temperature structure and not associated with precipitation or local convection. Experiments show that a VHF radar operated continuously can provide synoptically meaningful meteorological data and is capable of high time resolution data required by future numerical methods. (Author)

DESCRIPTORS: (U) *RELIABILITY, *MARKOV PROCESSES, *STOCHASTIC PROCESSES, DEFORMATION, SOLIDS, FATIGUE, SPHERES, SHAPE, SIGNALS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DESCRIPTORS: (U) *METEOROLOGICAL DATA, *WIND, *RADAR REFLECTIONS, DOPPLER SYSTEMS, CONVECTION, RADAR, RADIOSONDES, RESOLUTION, TIME, MEASUREMENT, PROFILES, PRECIPITATION, VERY HIGH FREQUENCY

IDENTIFIERS: (U) WUAFOSR2310A1, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
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CALIFORNIA UNIV BERKELEY DEPT OF MATHEMATICS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Lanczos Algorithm Applied to Modal Analysis of Very Large Structures.

(U) Limiting Behavior of the Norm of Products of Random Matrices and Two Problems of Geman-Hwang.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-1 Aug 85,

DESCRIPTIVE NOTE: Technical rept.,

AUG 85 27P

NOV 84 25P

PERSONAL AUTHORS: Parlett, B. N. ; Jensen, P. S. ; Erickson, T.

PERSONAL AUTHORS: Bai, Z. D. ; Yin, Y. Q. ;

CONTRACT NO. F49620-84-C-0090

REPORT NO. TR-84-46

PROJECT NO. 2304

CONTRACT NO. F49620-85-C-0008

TASK NO. A9

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0795

TASK NO. A5
MONITOR: AFOSR
TR-85-0817

UNCLASSIFIED REPORT

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ABSTRACT: (U) The general theory of the Lanczos algorithm for large symmetric eigenproblems is presented. This work was extended to apply to the large generalized symmetric eigenanalysis problem. This effort implements the results of the past research for application to large generalized problems arising in structural analysis. Keywords: Eigenanalysis; Symmetric matrices; Large sparse matrices; Structural analysis; Lanczos; Modal analysis; Generalized eigenproblems.

DESCRIPTORS: (U) *ALGORITHMS, *STRUCTURAL ANALYSIS, STRUCTURES, THEORY, SPARSE MATRIX

IDENTIFIERS: (U) Lanczos algorithm. WUAFOSR2304A9, PE61102F

ABSTRACT: (U) In the theory of large random matrices, how to dominate the norm of a random matrix is a very important problem. This paper considers a different type of random matrices, namely $-W$ to the k power, i.e. a power of a square random matrix with iid entries. The first result in this paper is the limit as n approaches infinity of the absolute value of $(W/\text{sq rt. } n)$ to the k power is $< \text{or } = (1+k)(\text{sigma to the } k \text{ power})$ where n is the size of W and here sigma-sq. is the variance of the entries of W . We assume only the existence of the 4-th moment of the entries of W . From this result it is easy to show that the spectral radius of $W/\text{sq rt } n$ is not greater than sigma with probability 1. This result is known only for iid $N(0, \text{sigma-sq})$ case. In proving the above result, a new kind of graphs has to be discussed carefully, and the truncation method used in Yin-Bai-Krishnaiah is also important here.

DESCRIPTORS: (U) *MATRICES(MATHEMATICS), BEHAVIOR, GRAPHS, LIMITATIONS, RADIUS(MEASURE), TRUNCATION

IDENTIFIERS: (U) *Random matrices, WUAFOSR2304A5, PE61102F

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) An Application of the Perron-Frobenius Theorem to a Damage Model Problem.

(U) Numerical Analysis.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Annual rept. 15 Jun 84-14 Jun 85.

APR 85 14P

JUN 85 6P

PERSONAL AUTHORS: Alzaid, A. A. ; Rao, C. R. ; Shanbhag, D. N.

PERSONAL AUTHORS: Parter, S. ;

REPORT NO. TR-85-13

PROJECT NO. 2304

CONTRACT NO. F49620-85-C-0008

TASK NO. A3

PROJECT NO. 2304

MONITOR: AFOSR TR-85-0763

TASK NO. A5

UNCLASSIFIED REPORT

MONITOR: AFOSR TR-85-0858

UNCLASSIFIED REPORT

ABSTRACT: (U) Using the Perron-Frobenius theorem, it is established that if (X, Y) is a random vector of non-negative integer valued components such that $Y < \text{or} = X$ almost surely and two modified Rao-Rubin conditions hold, then under some mild assumptions the conditional distribution of Y given X is uniquely determined by the conditional distribution of Y given X . This result extends the recent unpublished work of Shanbhag and Tallie (1979) on damage models. Keywords: Damage models; Modified Rao-Rubin condition; Perron-Frobenius theorem.

ABSTRACT: (U) A proposal emphasized research on iterative methods for the solution of discrete elliptic boundary-value problems. A topic of special interest is the study of multigrid iterative methods. Three reports were completed during this period: (1) On MGR (v) Multigrid Methods; (2) Multigrid and MGR (v); Methods for Diffusion Equations; and (3) A Note on Convergence of the Multigrid V-Cycle. Two have been accepted for publication, and one has just been submitted.

DESCRIPTORS: (U) *THEOREMS, *VECTOR ANALYSIS, DAMAGE, MODELS

DESCRIPTORS: (U) *ITERATIONS, *NUMERICAL ANALYSIS, BOUNDARY VALUE PROBLEMS, DIFFUSION, ELLIPSES, PROBLEM SOLVING, EQUATIONS

IDENTIFIERS: (U) Perron Frobenius theorem, WJAFOSR2304A5, PE61102F

IDENTIFIERS: (U) *Multigrid iterative methods, WJAFOSR2304A3, PE61102F

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MICHIGAN UNIV ANN ARBOR SUPERCOMPUTER ALGORITHM RESEARCH
LAB

MICHIGAN UNIV ANN ARBOR SUPERCOMPUTER ALGORITHM RESEARCH
LAB

(U) Conflict Sensitivity of Algorithms. Part 1. A CRAY X-
MP Study.

(U) Memory Conflict Simulation of a Many-Processor CRAY
Architecture. Part 1. A CRAY X-MP Study.

DESCRIPTIVE NOTE: Interim rept.,

DESCRIPTIVE NOTE: Interim rept.,

MAR 85 27P

MAR 85 50P

PERSONAL AUTHORS: Calahan, D. A. ;

PERSONAL AUTHORS: Calahan, D. A. ; Elliott, K. B. , III ;

REPORT NO. SARL-7

REPORT NO. SARL-6

CONTRACT NO. AFOSR-84-0096

CONTRACT NO. AFOSR-84-0096

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR
TR-85-0764

MONITOR: AFOSR
TR-85-0765

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A160 205.

SUPPLEMENTARY NOTE: See also AD-A160 206.

ABSTRACT: (U) The delay of algorithm execution due to memory conflicts in a 16-processor CRAY X-MP extension is considered. The association between memory access delays of reads and writes, and delays in the resultant algorithm execution is studied by defining an incremental algorithm delay sensitivity and relating it to simulated large-delay and random variations. It is shown that, by division algorithms with zero incremental sensitivity, library software highly resistant to large delays may be achieved in a multiprocessor X-MP. Additional keywords: Linear algebra; Supercomputers; Simulators. (Author)

ABSTRACT: (U) The performance of three Fortran kernels and two assembly kernels (including two linear algebra kernels) is simulated for a CRAY X-MP multiprocessor architecture of up to 16 processors and 256 memory banks. The effects of variations on the X-MP-2 memory conflict resolution protocol, including X-MP-4 protocol are studied. Additional keyword: Supercomputers; Simulators. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *READ WRITE MEMORIES, *CONFLICT, *SENSITIVITY, *DELAY, *LINEAR ALGEBRA, *SUPERCOMPUTERS, *COMPUTER PROGRAMS, *RANDOM VARIABLES, *LIBRARIES, *MULTIPROCESSORS, *SIMULATORS

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *MULTIPROCESSORS, *COMPUTERIZED SIMULATION, *CONFLICT, *MEMORY DEVICES, *SUPERCOMPUTERS, *FORTRAN, *KERNEL FUNCTIONS, *LINEAR ALGEBRA

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F

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RENSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

ERRORS, FINITE ELEMENT ANALYSIS, GRIDS, BOUNDARY VALUE PROBLEMS, CODING, CONSERVATION, DISPERSIONS, INDICATORS, HYPERBOLAS, VECTOR ANALYSIS, WAVEFRONTS

(U) A Two-Dimensional Mesh Moving Technique for Time Dependent Partial Differential Equations.

IDENTIFIERS: (U) *Mesh moving technique, WUAFOSR2304A3, PE61102F

DESCRIPTIVE NOTE: Interim rept.,

APR 85 52P

PERSONAL AUTHORS: Arney, D. C. ; Flaherty, J. E. ;

CONTRACT NO. DAAG29-82-K-0197, AFOSR-80-0192

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0828

UNCLASSIFIED REPORT

ABSTRACT: (U) This document discusses an adaptive mesh moving technique that can be used with a finite difference or finite element scheme to solve initial-boundary value problems for vector systems of partial differential equations in two space dimensions. The mesh moving technique is based on an algebraic node movement function determined from the geometry and propagations of regions having significant discretization error indicators. This procedure is designed to be flexible, so that it can be used with many existing finite difference and finite element methods. To test the mesh moving algorithm, it was implemented in a system code with an initial mesh generator and a McCormack finite difference scheme on quadrilateral cells for hyperbolic vector systems of conservation laws. Results are presented for several computational examples. The moving mesh scheme reduces dispersive errors near shocks and wave fronts and thereby reduces the grid requirements necessary to compute accurate solutions while increasing computational efficiency. Additional keywords: Error clustering. (Author)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *PARTIAL DIFFERENTIAL EQUATIONS, TWO DIMENSIONAL, MESH, TIME DEPENDENCE, COMPUTATIONS, EFFICIENCY, CLUSTERING,

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MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

(U) Quantitative Evaluation of Software Methodology.

(U) Numerical Solution of Navier-Stokes Problems by the Dual Variable Method.

DESCRIPTIVE NOTE: Technical rept.,

JUL 85 22P

APR 85 18P

PERSONAL AUTHORS: Bas111, V. R. ;

PERSONAL AUTHORS: Hall, C. A. ;

REPORT NO. CS-TR-1519

CONTRACT NO. AFOSR-80-0176

CONTRACT NO. F49620-80-C-0001, NSG-5123

PROJECT NO. 2304

TASK NO. A2

TASK NO. A3

MONITOR: AFOSR
TR-85-0803

MONITOR: AFOSR
TR-85-0769

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper presented a paradigm for evaluating software development methods and tools. The basic idea is to generate a set of goals which are defined into quantifiable questions which specify metrics to be collected on the software development and maintenance process and product. These metrics can be used to characterize, evaluate, predict and motivate. They can be used in an active as well as passive way by learning from analyzing the data and improving the methods and tools based upon what is learned from that analysis. Several examples were given representing each of the different approaches to evaluation. Additional keywords: Software measurement; Data acquisition; Models. (Author)

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *TEST AND EVALUATION, COMPUTER PROGRAMS, DATA ACQUISITION, LEARNING, MAINTENANCE, MEASUREMENT, METHODOLOGY, PASSIVE SYSTEMS

IDENTIFIERS: (U) WUAFOSR2304A2, PE61102F

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Alg. Disc. Meth., v6 n2 p220-236 Apr 85.

ABSTRACT: (U) Computational fluid dynamics as a research area has attracted mathematicians not only because of its importance to the engineering community, but also because of the pitfalls that are encountered in solving various discretizations of the governing Navier-Stokes equations. Such pitfalls are highlighted in this paper along with methods to circumvent them. Discretizations of the Navier-Stokes equations often can be viewed as systems defining flows on an associated network. This observation provides a means of economizing on their numerical solution. Additional keywords: reprints; convection; diffusion; fluid flow. (Author)

DESCRIPTORS: (U) *FLUID DYNAMICS, *NUMERICAL ANALYSIS, COMPUTATIONS, CONVECTION, ENGINEERS, FLUID FLOW, NAVIER STOKES EQUATIONS, REPRINTS, SOLUTIONS(GENERAL), VARIABLES, DIFFUSION, PROBLEM SOLVING

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

EFFECT, REPRINTS

(U) Evolved-Gas Zeeman Flame Atomic Absorption Spectrometry for the Determination of Arsenic Compounds.

IDENTIFIERS: (U) WUAFOSR2303a1, PEB1102F

85 9P

PERSONAL AUTHORS: Sakai, T.; Hanamura, S.; Winefordner, J. D.

CONTRACT NO. F49620-84-C-0002

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0846

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytica Chimica Acta, v170 p237-243 1985.

ABSTRACT: (U) The evolved-gas separation/flame Zeeman atomic absorption spectrometric approach is demonstrated for the speciation and determination of arsenic in oyster tissue. No digestion is needed and separation of inorganic arsenic compounds having similar boiling points is achieved. A stoichiometric or air-rich acetylene/air flame for atomic absorption spectrometry is not generally suitable for arsenic determination because of severe ultraviolet absorption interference at 193.7 nm and low sensitivity; polarized flame Zeeman atomic absorption spectrometry with a fuel-rich flame is suitable for the detection of traces of arsenic. The evolved-gas separation/Zeeman atomic absorption approach is simple, based on commercially available instrumentation, and useful for the selective determination of major arsenic compounds. Data are given to demonstrate optimal conditions and to show application to oyster tissue. (Author)

DESCRIPTORS: (U) *ATOMIC SPECTROSCOPY, *ARSENIC COMPOUNDS, *ABSORPTION SPECTRA, ARSENIC, DETERMINATION, INORGANIC COMPOUNDS, ATOMIC PROPERTIES, LOW LEVEL, SENSITIVITY, INTERFERENCE, ULTRAVIOLET RADIATION, ZEEMAN

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 196 12/1

TEXAS UNIV AT AUSTIN

(U) Convergence of Vector Quantizers with Applications to Optimal Quantization.

DESCRIPTIVE NOTE: Rept. for 1 Oct 80-30 Sep 85,

FEB 84 9P

PERSONAL AUTHORS: Abaya, E. F.; Wise, G. L.;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0784

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Applied Mathematics, v44 n1 p183-189 Feb 84.

ABSTRACT: (U) Suppose that a sequence of probability distribution functions (F_n) converges weakly to a distribution function F . Does the sequence of optimal quantizers for the F_n 's converge to an optimal quantizer for F ? If so, do the respective distortions converge to the optimal distortion for F ? Sufficient conditions are given to guarantee the convergence for both scalar and vector quantizers with a general class of distortion measures. These results are used to prove the existence of minimum r -th power distortion vector quantizers and the convergence of a proposed algorithm for constructing optimal quantizers. (Author)

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS. *QUANTIZATION, *WEAK CONVERGENCE, ALGORITHMS, DISTORTION, OPTIMIZATION, SEQUENCES, VECTOR ANALYSIS, REPRINTS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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AERODYNE RESEARCH INC BILLERICA MA

(U) Spectroscopic Diagnostics to Support Advanced Microelectronic Fabrication Techniques.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 84-1 Apr 85,

APR 85 34P

PERSONAL AUTHORS: Wormhoudt, J. C.; Stanton, A. C.;

REPORT NO. ARI-RR-469

CONTRACT NO. F49620-84-C-0036

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0810

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the first annual report on a program to develop laser spectroscopic diagnostics for detection of gas phase species important in fabrication processes for advanced semiconductor materials. It has two objectives, to obtain quantitative spectroscopic data for these molecules, and to apply diagnostics to model fabrication systems. This report summarizes progress in the areas of investigation identified in the first year: chlorine atom detection using an infrared tunable diode laser, which will also be used to instrument a plasma etching reactor, and infrared and laser induced fluorescence spectroscopic studies of SiF₂, CF₂, and SiH₂. Keywords include: Diagnostic Instrumentation, Electronic Materials, Infrared Absorption, Lasers, Laser-Induced Fluorescence, Microelectronic Fabrication, Semiconductor Processing, and Spectroscopy.

DESCRIPTORS: (U) *SEMICONDUCTORS, *TUNABLE LASERS, *DIAGNOSTIC EQUIPMENT, *LASER INDUCED FLUORESCENCE, *SPECTROSCOPY, MATERIALS, DETECTION, ELECTRONIC EQUIPMENT, VAPOR PHASES, DIODES, INFRARED LASERS, LASERS, FABRICATION, MICROELECTRONICS, ATOMS, CHLORINE, DETECTION, ABSORPTION, INFRARED RADIATION, DIAGNOSIS(GENERAL)

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LASERS, MODELS, MOLECULES, PROCESSING

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICS

IDENTIFIERS: (U) WUAFOSR2301A1, PE61102F

(U) Inference for Stationary Random Fields given Poisson Samples.

DESCRIPTIVE NOTE: Technical rept.,

JAN 85 12P

PERSONAL AUTHORS: Karr, A. F. ;

REPORT NO. TR-422

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0812

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper examines some questions of statistical inference -- specifically, estimation of the mean and covariance function, as well as linear state estimation -- for stationary random fields observable only at the points of a (likewise) Poisson process. Given a d-dimensional random field and a Poisson process independent of it, suppose that it is possible to observe only the location of each point of the Poisson process and the value of the random field at that (randomly located) point. Nonparametric estimators of the mean and covariance function of the random field - based on observation over compact sets of single realizations of the Poisson samples - are constructed. Under fairly mild conditions these estimators are consistent (in various senses) as the set of observation becomes unbounded in a suitable manner. The state estimation problem of minimum mean squares reconstruction of unobserved values of the random field is also examined.

DESCRIPTORS: (U) *STATISTICAL INFERENCE, COVARIANCE, ESTIMATES, NONPARAMETRIC STATISTICS, OBSERVATION, POISSON DENSITY FUNCTIONS, POISSON EQUATION, SAMPLING, STATIONARY, FUNCTIONS(MATHEMATICS)

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IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) The Limiting Distribution of Least Squares in an Errors-in-Variables Linear Regression Model.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

APR 85 28P

PERSONAL AUTHORS: Gleser, L. J. ; Carroll, R. J. ; Gallo, P. P.

REPORT NO. MMS-1577

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0869

UNCLASSIFIED REPORT

ABSTRACT: (U) There is a substantial literature concerning linear regression when some of the predictors (independent variables) are measured with error. Such models are of importance in econometrics (instrumental variables models), psychometrics (correction for attenuation, models of change), and in instrumental calibration studies in medicine and industry. Recent theoretical work concerning maximum likelihood estimation in such models appears in Healy (1980), Fuller (1980), and Anderson (1984), while Reilly and Patino-Leal (1981) take a Bayesian approach. In an applied context, an investigator may either overlook the measurement errors in the predictors, or choose the classical ordinary least squares (OLS) estimator of the parameters because of its familiarity and ease of use. Certainly, the methodology of classical least squares theory (confidence intervals, multiple comparisons, tests of hypotheses, residual analysis) is considerably more developed than the corresponding errors-in-variables methodology, particularly in samples of moderate size. In this paper, it is shown that under reasonable regularity conditions such linear combinations are (jointly) asymptotically normally distributed.

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DESCRIPTORS: (U) *LINEAR REGRESSION ANALYSIS, *LEAST SQUARES METHOD, ATTENUATION, CALIBRATION, CONFIDENCE LIMITS, INTERVALS, HYPOTHESES, ERRORS, MEASUREMENT, BAYES THEOREM, ECONOMETRICS, INDUSTRIES, DISTRIBUTION, LIMITATIONS, MAXIMUM LIKELIHOOD ESTIMATION, MEDICINE, PSYCHOMETRICS, THEORY, RESIDUALS, ASYMPTOTIC NORMALITY, MATHEMATICAL PREDICTION

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

(U) Construction of Exponential Martingales for Counting Processes.

DESCRIPTIVE NOTE: Technical rept. no. 10, 15 May 84-14 May 85.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

APR 85

13P

PERSONAL AUTHORS: Rosenkrantz, W. A. ;

CONTRACT NO. AFOSR-82-0167

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0868

UNCLASSIFIED REPORT

ABSTRACT: (U) Let $N(t)$ be a counting process with continuous compensator $A(t)$ and $f(t)$ a bounded predictable process. If $E(\exp(2/fN(t))) < \infty$ and $E(\exp(2(1 + \exp(f/A(t))) < \infty$ then it is shown that $Z(t) = \exp(-\int_0^t f(u) - 1/2A(u) du)$ is a martingale. This is a partial extension of a theorem of Kabanov, Liptser, Shiryaev (1980) who assumed $A(t) < \infty$ but did not assume $A(t)$ is continuous. Keywords: Random variables, Stochastic processes, Poisson processes, convergence.

DESCRIPTORS: (U) *COUNTING METHODS, *EXPONENTIAL FUNCTIONS, COMPENSATORS, RANDOM VARIABLES, POISSON DENSITY FUNCTIONS, STOCHASTIC PROCESSES, CONVERGENCE

IDENTIFIERS: (U) *Martingales

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APPLIED RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) The Influence of Specific Factors Affecting Spall in Explosively Loaded Soil.

DESCRIPTIVE NOTE: Final rept. 1 Aug 83-31 Jan 85.

MAR 85 87P

PERSONAL AUTHORS: Merkle, D. H. ; Partch, J. C. ; Dzwilewski, P. T. ;

CONTRACT NO. F49620-83-C-0145

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-0834

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this investigation was to evaluate the influence of explosion yield, soil hysteresis, and site layering on the shape and size of the spall zone due to directly coupled energy from a near surface explosion in soil. The investigation was done numerically on the contractor's HP1000 computer, using the Lagrangian, explicit, dynamic, finite difference computer code, STEALTH. The most important result is the observation that the computed directly coupled spall zone is pear shaped. The directly coupled spall zone size scales consistently with the cube root of the yield in the neighborhood of one megaton yield, and it dramatically reduced by hysteresis. The presence of a hard layer in one calculation had no effect on the maximum directly coupled spall depth on axis, but did increase the apex angle of the vertical cone within which directly coupled spall occurred. The calculations demonstrated conclusively that spall can be studied numerically using the STEALTH computer code. A more extensive numerical study should now be accomplished on a large mainframe computer, in which cratering and spall are investigated simultaneously. The purpose of such a study would be to evaluate the influence of early time source region details, and computational procedural details such as zone size, rezoning, and time step.

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SYSTEMS CONTROL TECHNOLOGY INC PALO ALTO CA

PRINCETON UNIV N J PLASMA PHYSICS LAB

(U) Adaptive Decentralized Control.

(U) Population Inversion and Gain Measurements for X-Ray Laser Development in Magnetically Confined Plasma Column in Fiscal Year 1984.

DESCRIPTIVE NOTE: Final rept. Jun 81-Jul 84.

APR 85 126P

DESCRIPTIVE NOTE: Annual rept. 1 Nov 83-31 Oct 84.

PERSONAL AUTHORS: Friedlander, B. ;

MAR 85 30P

REPORT NO. SCT-5400-03

PERSONAL AUTHORS: Suckewer, S. ;

CONTRACT NO. F49620-81-C-0051

CONTRACT NO. AFOSR-84-0025

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. A6

TASK NO. A8

MONITOR: AFOSR
TR-85-0791

MONITOR: AFOSR
TR-85-0809

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Report summarizes the results of a research effort directed towards the development of adaptive decentralized control systems. The adaptive controller in such a system must operate in the presence of unmodeled dynamics. An input-output approach was developed for analyzing the global stability and robustness properties of adaptive controllers under such circumstances. Conditions for guaranteeing global stability of the error system associated with the adaptive controller, and ensuring boundedness of the adaptive gains, were derived. Contents: Lattice Implementation of Some Recursive Parameter Estimation Algorithms; And Efficient Technique for Output Error Model Reduction; An Output Error Method for Design of Reduced Order Controllers; Robust Adaptive Control: Conditions for Global Stability; Decentralized Design of Decentralized Controllers.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *INPUT OUTPUT MODELS, DECENTRALIZATION, DYNAMICS, GLOBAL, STABILITY, ERRORS, REDUCTION, ERRORS, OUTPUT, ESTIMATES, RECURSIVE FUNCTIONS

IDENTIFIERS: (U) Robust procedures, PE61102F, WJAFOSR2304A6

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ABSTRACT: (U) This report covers X-ray laser development in magnetically confined plasmas, as well as in expanding recombining plasma columns using time resolved soft X-ray monochromators. Experiments with both solid and gas targets resulted in gain measurements for hydrogen-like Carbon(6+) (CVI) ions and population inversion measurements for lithium-like Neon(8+) (NeVIII) ions. Our most recent results, involving carbon disc targets in a 90 kGauss field with a 300 Joule carbon dioxide laser pulse, in which a one-pass gain of kl 6.5 (enhancement of stimulated emission over spontaneous emission about 100) was obtained for CVI 182A are presented. Results of a gain kl = 3.0 (k approx. 7.5/cm) for thick carbon fiber targets are also presented. Population inversions of NeVIII ions as a function of initial gas pressure are also discussed, as well as an overview of the instrumentation, experimental setup, and target configurations used. Keywords: X ray laser; XUV laser.

DESCRIPTORS: (U) *ULTRAVIOLET LASERS, CARBON, DISKS, TARGETS, GAIN, MEASUREMENT, GASES, CONFINEMENT(GENERAL), PLASMAS(PHYSICS), INVERSION, POPULATION, OPTIMIZATION, GASES, PRESSURE, IONS, GAIN, MONOCHROMATORS, CONFIGURATIONS, TARGETS, LASERS, X RAYS, CARBON FIBERS, THICKNESS, FAR ULTRAVIOLET RADIATION, EMISSION SPECTRA,

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NEON, MAGNETIC FIELDS

IDENTIFIERS: (U) *X ray lasers. PE61102F, WJAFOSR2301A8

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MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Time Scale Decomposition: The Role of Scaling in Linear Systems and Transient States in Finite-State Markov Processes.

DESCRIPTIVE NOTE: Interim rept.,

MAR 85 8P

PERSONAL AUTHORS: Lou, X. C.; Rohlicek, R.; Coxson, P. G.; Verghese, G. C.; Willisky, A. S.;

REPORT NO. LIDS-P-1445

CONTRACT NO. DAAG29-84-K-0005, AFOSR-82-0135

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0833

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper reports on recent work on time scale decomposition and aggregation of large-scale linear systems containing weak couplings and finite-state Markov processes containing rare transitions. This work builds on that of Coderch, et. al.. The focus of the work is on the asymptotic approximation of the linear system. (Author)

DESCRIPTORS: (U) *MARKOV PROCESSES, LINEAR SYSTEMS, SCALING FACTORS, DECOMPOSITION, SCALE, TIME, ASYMPTOTIC NORMALITY, APPROXIMATION(MATHEMATICS), COUPLING(INTERACTION)

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A1

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

ARIZONA UNIV TUCSON

(U) An Extension of Spitzer's Integral Representation Theorem with an Application.

(U) Saguario: A Distributed Operating System Based on Pools of Servers.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 84,

APR 85 13P

MAR 85 4P

PERSONAL AUTHORS: Alzaid, A. A. ; Rao, C. R. ; Shanhag, D. N.

PERSONAL AUTHORS: Andrews, G. R. ; Schlichting, R. D. ;

REPORT NO. TR-85-11

REPORT NO. TR-84

CONTRACT NO. F49620-85-C-0008

CONTRACT NO. AFOSR-84-0072

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A2

MONITOR: AFOSR
TR-85-0856

MONITOR: AFOSR
TR-85-0821

UNCLASSIFIED REPORT

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ABSTRACT: (U) Using a new approach, an extended version of Spitzer's integral representation for stationary measures of a discrete branching process is obtained. This result is used to provide a complete solution to a problem in damage models satisfying a generalized Rao-Rubin condition. Additional keywords: Cauchy equation; potential theory; Markov chains. (Author)

ABSTRACT: (U) The progress achieved during the first year of the integrated Saguario distributed operating system project is presented. The major accomplishments were the completion of the initial design and preliminary implementation of several system components, the subsequent refinement of the user interface and the file system, and the investigation into the use of a universal type system to type data and specify interfaces in the operating system. Additional keywords: local area communications networks; and computer architecture.

DESCRIPTORS: (U) *CAUCHY PROBLEM, *INTEGRALS, *POTENTIAL THEORY, EQUATIONS, MARKOV PROCESSES, STATIONARY, INTEGRALS, THEOREMS

DESCRIPTORS: (U) *COMMUNICATIONS NETWORKS, *COMPUTER ARCHITECTURE, FILES(RECORDS), INTERFACES, USER NEEDS

IDENTIFIERS: (U) Rao Rubin condition, Spitzer integral representation, PE61102F, WUAFOSR2304A5

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER
(U) Nonlinear Wave Propagation Study. PROPERTIES, AMPLITUDE, NONLINEAR SYSTEMS, WAVE
PROPAGATION, RELAXATION, LOOPS, STRESS STRAIN RELATIONS

IDENTIFIERS: (U) PE62714E
DESCRIPTIVE NOTE: Semi-annual technical rept. no. 3, 1
Dec 84-31 May 85.

JUL 85 44P

PERSONAL AUTHORS: Bulau, J. R.; Tittman, B. R.;

REPORT NO. SC5361.8SA

CONTRACT NO. F49620-83-C-0065, DARPA Order-4400

PROJECT NO. 3A10

MONITOR: AFOSR
TR-85-0792

UNCLASSIFIED REPORT

ABSTRACT: (U) In this document we report the results of combined high amplitude tensile and compressive loading experiments on four different rock types: Westerly granite, Boise sandstone, Berea sandstone, and Indiana limestone. The details of the stress-strain hysteresis loops are examined, with emphasis on investigating the elastic and inelastic properties of rocks at nonlinear amplitudes in both tension and compression. The results indicate that the mechanical behavior of rocks can be significantly different in compression than in tension and that the onset of nonlinear effects with increasing strain may not be the same for compressive loads as for tensile loads. All available evidence indicates that the primary relaxation mechanism at nonlinear amplitudes between 10 to the -6th power strain and 0.0001 strain involves intergranular friction. More experimental work in this area will shed light on the issue of linearity vs. nonlinearity at intermediate strains, and also will provide realistic detailed information about rock rheology for the numerical modeling of near-field seismic pulse propagation. (Author)

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *LIMESTONE, *ROCK, *NONLINEAR PROPAGATION ANALYSIS, *SANDSTONE, ELASTIC PROPERTIES, NEAR FIELD, PROPAGATION, PULSES, SEISMIC WAVES, MATHEMATICAL MODELS, RHEOLOGY, INDIANA, MECHANICAL

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Moving Average Models with Bivariate Exponential and Geometric Distributions.

DESCRIPTIVE NOTE: Technical rept..

MAR 85 25P

PERSONAL AUTHORS: Langberg, N. A. ; Stoffer, D. S. ;

REPORT NO. TR-85-07

CONTRACT NO. F49620-85-C-0008, AFOSR-84-0113

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0862

UNCLASSIFIED REPORT

ABSTRACT: (U) Two classes of finite and infinite moving average sequences of bivariate random vectors are considered. The first class has bivariate exponential marginals while the second class has bivariate geometric marginals. The theory of positive dependence is used to show that in various cases the two classes consist of associated random variables. Association is then applied to establish moment inequalities and to obtain approximations to some joint probabilities of the related bivariate point processes. Additional keywords: Mathematical models.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, APPROXIMATION(MATHEMATICS), BIVARIATE ANALYSIS, EXPONENTIAL FUNCTIONS, STATISTICAL DISTRIBUTIONS, INEQUALITIES, MOMENTS, THEORY, GEOMETRY, RANDOM VARIABLES

IDENTIFIERS: (U) *Moving average models; PE61102F, WUAFO5R2304A5

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STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) An Efficient, RLS (Recursive-Least-Squares) Data-Driven Echo Cancellor for Fast Initialization of Full-Duplex Data Transmission.

JUN 85 6P

PERSONAL AUTHORS: Cioffi, J. M. ; Kailath, T. ;

CONTRACT NO. F49620-79-C-0058

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0762

UNCLASSIFIED REPORT

ABSTRACT: (U) Computationally efficient Recursive-Least-Squares (RLS) procedures are presented specifically for the adaptive adjustment of the Data-Driven Echo Cancellers (DDECs) that are used in voiceband full-duplex data transmission. The methods are shown to yield very short learning times for the DDEC while they also simultaneously reduce computational requirements to below those required for other least-square procedures, such as those recently proposed by Salz (1983). The new methods can be used with any training sequence over any number of iterations, unlike any of the previous fast-converging methods. The methods are based upon the Fast Transversal Filter (FTF) RLS adaptive filtering algorithms that were independently introduced by the authors of this paper; however, several special features of the DDEC are introduced and exploited to further reduce computation to the levels that would be required for slower-converging stochastic-gradient solutions. Several trade-offs between computation, memory, learning-time and performance are also illuminated for the new initialization. (Author)

DESCRIPTORS: (U) *ADAPTIVE SYSTEMS, *FILTERS, *DATA TRANSMISSION SYSTEMS, *LEAST SQUARES METHOD, ALGORITHMS, COMPUTATIONS, REQUIREMENTS, DUPLEXERS, ITERATIONS, ELECTROMAGNETIC WAVE FILTERS, TRANSVERSE WAVES, SEQUENCES, TRAINING

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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IDENTIFIERS: (U) PEG1102F, WJAFOSR2304AG

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Polarization Properties of the Variable-Grating-Mode
Liquid-Crystal Device,

84 4P

PERSONAL AUTHORS: Tanguay, A. R., Jr.; Chavel, P.; Strand, T.
C.; Wu, C. S.;

CONTRACT NO. AFOSR-83-0185

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-85-0835

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optics Letters, v9 n5 p174-
176 May 84.

ABSTRACT: (U) The principal features of the liquid-
crystal molecular orientation within the variable-grating
mode liquid-crystal device have been determined as a
function of the applied voltage across the cell by
measurement of the polarization properties of light
diffracted by the liquid-crystal birefringent phase
grating. (Author)

DESCRIPTORS: (U) *LIQUID CRYSTALS, *GRATINGS(SPECTRA),
VOLTAGE, MOLECULES, ORIENTATION(DIRECTION), REPRINTS,
BIREFRINGENCE, LIQUID CRYSTALS, PHYSICAL PROPERTIES,
POLARIZATION

IDENTIFIERS: (U) PEG1102F, WJAFOSR2305B1

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FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Evaluation of Microwave-Induced Air-Plasma as an Excitation Source.

85 6P

PERSONAL AUTHORS: Zhang, Y. K. ; Hanamura, S. ; Winefordner, J. D. ;

CONTRACT NO. F49620-84-C-0002

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0847

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Spectroscopy, v38 n2
p226-230 1985.

ABSTRACT: (U) A single-electrode atmospheric pressure microwave discharge air-plasma is reported. Fundamental characteristics, such as the effects of microwave power, auxiliary air flow, and nebulizer air flow on emission intensity, detection limits, and dynamic ranges for twelve elements and several interference experiments are reported. The plasma temperature is found to be about 4700 K. This simple system can be applied to the spectrochemical analysis of solution samples. The results with the use of this system to determine calcium, sodium, and potassium in SRM-1566 (oyster tissue) and SRM-92 (low-boron glass) show excellent agreement with NBSs certified values. Keywords: Microwave Plasma; Air Plasma; Reprints.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *AIR FLOW, *RADIOFREQUENCY POWER, *ATOMIZATION, AIR, CALCIUM, DYNAMIC RANGE, EMISSION, INTENSITY, MICROWAVES, TEMPERATURE, REPRINTS, SAMPLING, SOLUTIONS(GENERAL), AUXILIARY, LIMITATIONS, EXCITATION, SOURCES, POTASSIUM, SODIUM, CHEMICAL ANALYSIS

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303A1

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FLORIDA UNIV GAINESVILLE DEPT OF ENGINEERING SCIENCES

(U) Internal Material Damping of Polymer Matrix Composites under Off-Axis Loading.

85 15P

PERSONAL AUTHORS: Sun, C. T. ; Gibson, R. F. ; Chaturvedi, S. K. ;

CONTRACT NO. AFOSR-83-0154

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0849

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Materials Science,
v20 p2575-2585 1985.

ABSTRACT: (U) The objective of this paper is to determine theoretically the material damping of short fibre-reinforced polymer matrix composites. The major damping mechanism in such composites is the viscoelastic behaviour of the polymer matrix. The analysis was carried out by developing a finite-element program which is capable of evaluating the stress and strain distribution of short fibre composites under axial loading. Using the concept of balance of force we can express the modulus E sub x along the loading direction as a function of the mechanical properties of the fibre and matrix materials, fibre aspect ratio, 1/d loading angle, theta, and fibre volume fraction, V sub f. Then we apply the elastic-viscoelastic correspondence principle to replace all the mechanical properties of the composite, fibre and matrix materials. The results of this paper can be used to optimize the performance of composite structures. Keywords: stiffing damping. (Reprint)

DESCRIPTORS: (U) *DAMPING, *MATRIX MATERIALS, *FIBER REINFORCED COMPOSITES, LOADS(FORCES), AXES, ASPECT RATIO, FIBERS, FINITE ELEMENT ANALYSIS, ANGLES, POLYMERS, BALANCE, INTERNAL, MECHANICAL PROPERTIES, COMPOSITE MATERIALS, SHORT RANGE(TIME), BEHAVIOR, VISCOELASTICITY,

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STRAIN(MECHANICS), MATERIALS

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION
AND DECISION SYSTEMS

IDENTIFIERS: (U) PE61120F, WUAFOSR2303A3

(U) A Layer Stripping Solution of the Inverse Problem for
a One-Dimensional Elastic Medium,

MAR 85 10P

PERSONAL AUTHORS: Yagle, A. E. ; Levy, B. C. ;

CONTRACT NO. AFOSR-82-0135

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0776

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Geophysics, v50 n3 p425-433
Mar 85.

ABSTRACT: (U) A fast algorithm for recovering profiles of density and Lamé parameters as functions of depth for the inverse seismic problem in an elastic medium is obtained. The medium is probed with planar impulsive P- and SV-waves at oblique incidence, and the medium velocity components are measured at the surface. The interconversion of P- and SV-waves defines reflection coefficients from which the medium parameter profiles are obtained recursively. The algorithm works on a layer-stripping principle, and it is specified in both differential and recursive forms. A physical interpretation of this procedure is given in terms of a lattice filter, where the first reflections of the downgoing waves in each layer yield the various reflection coefficients for that layer. A computer run of the algorithm on the synthetic impulse plane-wave responses of a twenty-layer medium shows that the algorithm works satisfactorily. Originator supplied keywords: Layer stripping; P- and SV-waves; synthetic plane-wave responses.

DESCRIPTORS: (U) *SEISMIC WAVES, *STRATIGRAPHY, *SEISMIC REFLECTION, ALGORITHMS, COEFFICIENTS, DEPTH, ELASTIC PROPERTIES, FUNCTIONS, INVERSION, DENSITY, LAYERS, ONE

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DIMENSIONAL, PARAMETERS, PLANE WAVES, PROFILES, PULSES,
REFLECTION, RESPONSE, REPRINTS

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

IDENTIFIERS: (U) Inverse problem, PE61102F,
WUAFOSR2304A1

(U) Electronic Structure of the Lithium Molecular Anion,
Li₂.

DESCRIPTIVE NOTE: Journal article,

JUL 85 6P

PERSONAL AUTHORS: Michels, H. H. ; Hobbs, R. H. ; Wright, L. A.

REPORT NO. UTRC-926533-5

CONTRACT NO. F49620-83-C-0094

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0739

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters,
v118 n1 p67-71, 12 Jul 85.

ABSTRACT: (U) The electronic structure of the ground and excited states of the Li₂(-) anion has been studied using optimized CI wavefunctions. The low-lying 2 Sigma (+) sub g state is of the Feshbach type and exhibits a near-degeneracy between 2 Sigma (+) sub g (nu'=0) of Li₂(-) and 1 Sigma (+) sub g (nu = 6) of Lithium 2. In contrast with the H₂(-) system, we find a rich spectrum of low-lying resonant states for Li₂(-). Keywords: Potential energy curves; Reprints; Lithium molecular anion.

DESCRIPTORS: (U) *MOLECULAR IONS, *MOLECULAR STRUCTURE,
*ELECTRONIC STATES, *LITHIUM, POTENTIAL ENERGY, REPRINTS,
ANIONS, MOLECULES, WAVE FUNCTIONS

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7

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SEARCH CONTROL NO. EVK15N
CONTINUED

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Laser Physics and Laser Techniques.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Mar 84-28
Feb 85.

MAY 85 35P

DESCRIPTORS: (U) *HETEROJUNCTIONS, *LASER APPLICATIONS,
COEFFICIENTS, CONSISTENCY, DAMAGE ASSESSMENT, EPITAXIAL
GROWTH, HIGH TEMPERATURE, HOLES(ELECTRON DEFICIENCIES),
MEASUREMENT, MOLECULAR BEAMS, ORGANOMETALLIC COMPOUNDS,
PLASMAS(PHYSICS), QUANTUM THEORY, RECOMBINATION REACTIONS,
SEMICONDUCTORS, SOLIDS, SURFACES, TRANSFORMATIONS, VAPOR
DEPOSITION

PERSONAL AUTHORS: Stegman, A. E. ; Trebino, R. ; Fouquet, J. E.
; Fauchet, P. M. ;

IDENTIFIERS: (U) Femtosecond time, Quantum wells,
PE61102F, WUAFOSR2301A1

CONTRACT NO. F49820-84-C-0041

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0882

UNCLASSIFIED REPORT

ABSTRACT: (U) Research involving femtosecond-process measurement in the frequency domain, laser surface transformations and damage mechanisms, the study of specific quantum-well structures, and the development of optical beam expanders were completed. In particular, attempts to suppress troublesome thermal-grating effects in frequency-domain measurements of femtosecond processes produced two entirely different--and successful-- techniques, each of which yields other advantages as well. Our studies of laser-solid interactions have led to a better understanding of transient electronic processes in very dense and hot electron-hole plasma in semiconductors and of the formation of single-lase-beam-induced spontaneous surface ripples on a multitude of solid materials. Our time-resolved studies of GaAs/AlxGa1-xAs quantum well structures successfully measured the photoluminescence decay times of carriers in structures grown by both molecular beam epitaxy and metalorganic chemical vapor deposition. Much was learned about the nature of nonradiative recombination dynamics in these structures. Results consistency indicated that the fundamental radiative recombination coefficient, B, in quantum wells is quite small. Optimal designs were developed for achromatic prism beam expanders, based on a remarkably simple and elegant theoretical analysis.

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PENNSYLVANIA STATE UNIV UNIVERSITY PARK COLL OF EARTH
AND MINERAL SCIENCES

COMPUTATIONS, SOURCES, WAVEFORMS, DISTORTION, PHASE,
SHALLOW DEPTH, AMPLITUDE, MOTION, PARAMETERS, SEISMIC
DATA, SYNTHESIS, MOTION, VERTICAL ORIENTATION, LONG
RANGE(DISTANCE), WAVE PROPAGATION, RAY TRACING

(U) Calculation of Source and Structure Parameters at
Regional and Teleseismic Distances.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 83-3 Mar 85.

IDENTIFIERS: (U) WKBJ method, *Inverse problems,
WJAFOSR2309A1, PE61102F

MAY 85 107P

PERSONAL AUTHORS: Langston, C. A. ; Greenfield, R. J. ;

CONTRACT NO. F49620-83-K-0019, ARPA Order-4397

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-0753

UNCLASSIFIED REPORT

ABSTRACT: (U) Teleseismic SV waves have been generally ignored in wave propagation and source studies because of known complications in wave propagation for structure near the source and near the receiver. The validity of common optic ray and WKBJ seismogram methods for computing SV synthetic seismograms is examined by and comparing them to SV synthetics produced from a wavenumber integration technique. Both ray methods give a poor approximation to the wave propagation for distances less than 60 deg. Diffracted Sp and the SPL wave interfere with near source phases, such as S, pS, and sS for a shallow seismic source, producing anomalously high amplitudes and complex waveforms in agreement with observational experience. Because of the Moho Sp and diffracted Sp phases, the vertical component of motion shows greater distortion, relative to the ray theory result, than does the radial component of motion. Ray theory appears to be appropriate for the initial 20 seconds of the SV wavetrain from a shallow source for ranges greater than 60 deg. SV waves from deep sources are less affected by diffracted Sp and SPL than SV from shallow sources.

DESCRIPTORS: (U) *SEISMIC WAVES, *DIFFRACTION ANALYSIS.

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ELECTROMAGNETIC LAUNCH RESEARCH INC CAMBRIDGE MA

COUPLING (INTERACTION), EFFICIENCY, ELECTRICITY, ENGINES,
EROSION, HIGH DENSITY, IMPEDANCE, INDUCTION SYSTEMS,
KINETIC ENERGY, MAGNETIC FIELDS, MASS, MATHEMATICAL
MODELS, METALS, OPERATION, PULSES, RESPONSE, SOLIDS,
THRUST

(U) Metallic Induction Reaction Engine.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-30 Jun 84.

DEC 84 143P

IDENTIFIERS: (U) WUAFOSR2308A1, PEG1102F

PERSONAL AUTHORS: Mongeau, P. P. ; Hart, D. P. ;

REPORT NO. EML-85-AF001

CONTRACT NO. F49620-83-C-0126

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0773

UNCLASSIFIED REPORT

ABSTRACT: (U) Advances in electrical propulsion technology have inspired a variety of approaches for orbit raising propulsion. One such technique, the metallic induction reaction engine, uses a solid metallic reaction mass rather than a gas or plasma to achieve high thrust density and efficiency. The reaction mass is inductively accelerated by a magnetic pulse coil, thereby eliminating the problems of erosion and wear. The basic mechanisms and limits of the conversion of electrical energy into kinetic energy by the metallic induction reaction engine are analyzed. To facilitate this, a single shot experimental engine was constructed and operated over one hundred times, including several tests with conversion efficiencies greater than 50%. Further analyses were performed by developing a numerical model. The velocity and current predicted by this model agree to within 15% of the experimental data over the entire range of operation. Extrapolation to higher performance operation has revealed that there are adverse coupling effects and circuit impedance effects which can limit the ultimate performance of the metallic induction reaction engine.

DESCRIPTORS: (U) *ELECTRIC PROPULSION, ADVERSE
CONDITIONS, CIRCUITS, COILS, CONVERSION.

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MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Comparing the Effectiveness of Software Testing Strategies.

detected nor control than did the other methods. (7) When asked to estimate the percentage of faults detected, code readers gave the most accurate estimates while functional testers gave the least accurate estimates. Appendix B includes the source code for the word.

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 73P

DESCRIPTORS: (U) *TEST METHODS, *COMPUTER PROGRAM

VERIFICATION, CODING, COMPUTER PROGRAMS, COSTS, DETECTION, ESTIMATES, FAULTS, HIGH RATE, INTERFACES, PROGRAMMERS, RATES, READING, SOURCES, STRATEGY, STUDENTS, TEST AND EVALUATION, OPERATIONAL EFFECTIVENESS, COMPARISON

PERSONAL AUTHORS: Basili, V. R.; Selby, R. W., Jr.;

REPORT NO. CS-TR-1501

IDENTIFIERS: (U) WJAFOSR2304A2, PE61102F

CONTRACT NO. F49820-80-C-0001, NSG-5123

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0805

UNCLASSIFIED REPORT

ABSTRACT: (U) This study compares the results of code reading, functional testing, and structural testing in three aspects of software testing: fault detection effectiveness, fault detection cost, and classes of faults detected. Thirty two professional programmers and 42 advanced students applied the three techniques to four unit-sized programs in a fractional experimental design. The major results of this study are the following. (1) With the professional programmers, code reading detected more software faults and had a higher detection rate than did functional or structural testing, while functional testing detected more faults than did structural testing, but functional and structural testing were not different in fault detection rate. (2) In one advanced student subject group, code reading and functional testing were not different in faults found, but were superior to structural testing, while in the other advanced student subject group there was no difference among the techniques. (3) With the advanced student subjects, the three techniques were not different in fault detection rate. (4) Number of faults observed, fault detection rate, and total effort in detection depended on the type of software tested. (5) Code reading detected more interface faults than did the other methods. (6) Functional testing

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MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
RESEARCH

IDENTIFIERS: (U) *Trees(Mathematics), WUAFOSR2304K2,
PE61102F

(U) On Using Inverted Trees for Updating Graph Properties.

DESCRIPTIVE NOTE: Technical rept..

MAY 85 21P

PERSONAL AUTHORS: Pavagi,S. ;Ramakrishnan,I. V. ;

REPORT NO. CAR-TR-117, CS-TR-1492

CONTRACT NO. F49620-83-C-0082, N00014-84-K-0530

PROJECT NO. 2304

TASK NO. K2

MONITOR: AFOSR
TR-85-0822

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-ECS84-04399.

ABSTRACT: (U) Fast parallel algorithms are presented for updating connected components and bridges of an undirected graph when a minor change has been made to the graph, such as addition or deletion of vertices and edges. The matching model used is a parallel random access machine which allows simultaneous reads but prohibits simultaneous writes into the same memory location. The algorithms described in this paper require $O(\log n)$ time and use $C(n^2)$ processors. These algorithms are efficient when compared to previously known algorithms for finding connected components and bridges that require $O(\log^2 n)$ time and use $O(n^2)$ processors. The previous solution is maintained using an inverted tree (a rooted tree where a node points toward its parent) and after a minor change the new solution is rapidly computed from this tree.

DESCRIPTORS: (U) *ALGORITHMS, *GRAPHS, PARALLEL PROCESSING, INVERSION, TREES, SOLUTIONS(GENERAL), BRIDGES, MEMORY DEVICES, POSITION(LOCATION), RANDOM ACCESS COMPUTER STORAGE

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AD-A160 131 7/4

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

ILLINOIS INST OF TECH CHICAGO

(U) Poisson-Stability as a Unifying Factor for Max-Stability and Sum-Stability.

(U) Spectroscopy and Energy Transfer Kinetics of the Interhalogens.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

DESCRIPTIVE NOTE: Final rept. Apr 83-Mar 84.

JUN 85 51P

MAR 84 39P

PERSONAL AUTHORS: Haan, L. de ; Pickands, J. , III ;

PERSONAL AUTHORS: Heaven, M. C. ;

REPORT NO. TR-101

CONTRACT NO. AFOSR-83-0173

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. B1

TASK NO. A5

MONITOR: AFOSR
TR-85-0800

MONITOR: AFOSR
TR-85-0878

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The theory of non-normal sum-stable random variables, vectors and processes is, by now, well developed. An analogous theory is that of max-stability. We show that both theories are, in their entireties, consequences of the theory of stable Poisson point processes on multidimensional spaces. Additional keywords: Stochastic integration; multivariate analysis; Points(mathematics).

ABSTRACT: (1) The electronic quenching of Br₂ (B) by Br₂ (X) and He was investigated in the gas phase. Non-linear self quenching plots revealed the presence of rapid energy transfer to predissociated levels. Quenching and rotational energy transfer rates of 4.2 x 10 to the 10th power and approx. 8 x 10 to the -10th power cc/molecule/s respectively were obtained by kinetic modeling. Near-resonant vibrational energy transfer also contributes to the deactivation process, and this occurs with a rate constant > 3.5 x 10 to the 10th power cc/molecule/s. Electronic quenching of Br₂ (B) by He was found to be slow (k sub q < 2 x 10 to the 12th power cc/molecule/s), but deactivation by rapid rotational and vibrational energy transfer (k sub t > 10 to the -10 power cc/molecule/s) was observed. Gas phase electronic quenching of I₂ (B) by He at 9.4K was studied in a free jet expansion. An effective cross section of 0.33 sq A was obtained, demonstrating a significant collision energy dependence for this parameter. Simple trajectory calculations show that this result is compatible with a collision induced predissociation model of the deactivation process. The HeBr₂ Van der Waals complex was observed in a free jet expansion. The complex was detected by laser excitation of the bands associated with the Br₂(B - X) system. Excitation spectra and polarization measurements provided insights into the excitation and relaxation mechanisms

DESCRIPTORS: (U) *POINTS(MATHEMATICS), *STABILITY, INTEGRATION, MULTIVARIATE ANALYSIS, POISSON DENSITY FUNCTIONS, RANDOM VARIABLES, STOCHASTIC PROCESSES, VECTOR ANALYSIS

IDENTIFIERS: (U) WUAFOSR2304A5, PEB1102F

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present in the matrix.

DESCRIPTORS: (U) *ELECTRONIC STATES, *ENERGY TRANSFER, *HALOGEN COMPOUNDS, BROMINE, MOLECULAR VIBRATION, MOLECULAR ROTATION, HELIUM, DEACTIVATION, VAPOR PHASES, KINETICS, COLLISIONS, RESONANCE, MEASUREMENT, POLARIZATION, TRAJECTORIES, SPECTROSCOPY, NONLINEAR SYSTEMS, QUENCHING, RELAXATION, ROTATION

IDENTIFIERS: (U) Van Der Walls Forces. WJAFOSR2303B1, PE61102F

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Characterization of Discrete Probability Distributions by Partial Independence.

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 19P

PERSONAL AUTHORS: Aizaid, A. A. ; Rao, C. R. ; Shanbhag, D. N.

REPORT NO. TR-85-16

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0860

UNCLASSIFIED REPORT

ABSTRACT: (U) If X and Y are random variables such that $P(X > Y) = 1$ and the conditional distribution of Y given X is binomial, then Moran (1952) showed that Y and $(X-Y)$ are independent if X is Poisson. This document extends Moran's result to a more general type of conditional distribution of Y given X , using only partial independence of Y and $X-Y$. This provides a generalization of a recent result of Janardhan and Rao (1982) on the characterization of generalized Polya-Eggenberger distribution. A variant of Moran's theorem is proved which generalizes the results of Patil and Seshadri (1964) on the characterization of the distribution of a random variable x based on some conditions on the conditional distribution of Y given X and the independence of Y and $X-Y$.

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, RANDOM VARIABLES, DISCRETE DISTRIBUTION

IDENTIFIERS: (U) WJAROSR2304A5, PE61102F

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MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

CARNEGIE-MELLON UNIV PITTSBURGH PA ROBOTICS INST

(U) Hypothesis Integration in Image Understanding Systems.

(U) The Role of Intelligent Reactive Processing in Production Management.

DESCRIPTIVE NOTE: Interim rept..

DESCRIPTIVE NOTE: Technical rept..

JUN 85 103P

APR 85 6P

PERSONAL AUTHORS: Hwang, V. S. S. ; Davis, L. S. ; Matsuyama, T. ;

PERSONAL AUTHORS: Fox, M. S. ; Smith, S. F. ;

REPORT NO. CAR-TR-130, CS-TR-1513

CONTRACT NO. F49620-82-K-0017

CONTRACT NO. F49620-83-C-0082, NASA9-16684

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A7

TASK NO. K2

MONITOR: AFOSR TR-85-0781

MONITOR: AFOSR TR-85-0876

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research is to develop a robust control strategy for constructing image understanding systems (IUS). This paper proposes a general framework based on the integration of 'related' hypotheses. Hypotheses are regarded as predictions of the occurrences of objects in the image. Related hypotheses are clustered together. A 'composite hypothesis' is computed for each cluster. The goal of the IUS is to verify the hypotheses. We constructed an image understanding system, SIGMA, based on this framework and demonstrated its performance on an aerial image of a suburban housing development. Keywords include: image understanding systems, SIGMA, and robust control strategy.

DESCRIPTORS: (U) *AERIAL PHOTOGRAPHY, *HYPOTHESES, *INTEGRATION, CONTROL, STRATEGY

IDENTIFIERS: (U) WJAFOSR2304K2, PEB1102F

ABSTRACT: (U) Our work has been concerned with the construction of intelligent systems for production management and control. This paper focuses on the reactive capabilities that such systems must possess to be of practical use in dynamic environments. These capabilities include monitoring events on the factory floor, identifying deviations from predicted production schedules, and intelligent schedule repair. Keywords include: Intelligent systems and Production management.

DESCRIPTORS: (U) *PRODUCTION CONTROL, *MANAGEMENT, FLOORS, INDUSTRIAL PLANTS, SCHEDULING, PRODUCTION

IDENTIFIERS: (U) *Intelligent systems, WJAFOSR2304A7, PEB1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
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FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

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

DESCRIPTIVE NOTE: Annual rept. 1 Oct 84-30 Sep 85,

OCT 85 12P

PERSONAL AUTHORS: Hollander, M.; Proschan, F.;

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0794

UNCLASSIFIED REPORT

ABSTRACT: (U) During this period, a total of 11 research papers were issued, 5 papers were published in scientific journals or volumes, and 12 papers are in press of accepted for publication. The research performed under this contract developed theory, concepts, and methods in reliability, availability, and maintainability in a variety of topic areas. Some of the topic areas treated include: Optimum assembly of systems; Multistate system theory; Testing whether a new item is stochastically longer-lived than an item of specified age; Nonparametric estimation of a discrete survival function when observations are censored, yielding a smoother estimate than the standard Kaplan-Meier method estimate; Measuring the effect of increased censorship on an estimate of a life distribution; A generalization of total positivity; Characterization of discrete IFR distributions based on coincidences among order statistics; Extension of Schur functions and majorization to the continuous case; Testing whether new is better than used of a specified age with randomly censored data; Further multivariate probability inequalities using Schur functions and increasing in arrangement functions; Simultaneous estimation of coherent system survival function and component survival functions using censored data; Development of maintenance models in which maintenance actions are subject to random error; and Development of

new Markov stochastic processes corresponding to notions of IFR, IFRA, etc.

DESCRIPTORS: (U) *STATISTICAL PROCESSES, ASSEMBLY, COHERENCE, ESTIMATES, FUNCTIONS, MAINTAINABILITY, MAINTENANCE, MARKOV PROCESSES, INEQUALITIES, MULTIVARIATE ANALYSIS, NONPARAMETRIC STATISTICS, OPTIMIZATION, AVAILABILITY, PERIODICALS, PROBABILITY, RELIABILITY, REPORTS, MATHEMATICAL MODELS, SURVIVAL (GENERAL)

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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MASSACHUSETTS UNIV AMHERST DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

TEXAS UNIV AT AUSTIN

(U) Fault-Tolerant Multiprocessor Link and Bus Network
Architectures.

(U) A Note on a Common Misconception in Estimation.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 80-30 Sep 85.

JAN 85 13P

APR 85 4P

PERSONAL AUTHORS: Pradhan, D. K. ;

PERSONAL AUTHORS: Wise, G. L. ;

CONTRACT NO. AFOSR-84-0052

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A2

TASK NO. A5

MONITOR: AFOSR
TR-85-0840

MONITOR: AFOSR
TR-85-0790

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Computers, V34 n1 p33-45 Jan 85.

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters,
V5 n5 p355-356 Apr 85.

ABSTRACT: (U) This paper presents a general class of
regular networks which provide optimal (near-optimal)
fault tolerance. The proposed networks compare favorably
to other regular networks such as leaf-ringed binary
trees and cube networks. In particular, the networks
proposed possess certain advantages in that the number of
connections per node is neither and arbitrarily fixed
number (as in leaf-ringed trees) nor does it grow
arbitrarily large with the size of the network (as in
cube networks). This point has significant relevance to
fault tolerance in that the degree of fault tolerance
provided by the network can be varied according to the
design specification. Also, the networks admit simple
self-routing of messages and that routing is adaptable to
faults. Keywords include: Regular networks; Algorithmic
routing; Circuit switching connectivity; Diameter of
graphs; and Multiple bus network.

ABSTRACT: (U) An example illustrating a common
misconception in minimum mean squared error estimation is
presented in this reprint. (Author).

DESCRIPTORS: (U) *NETWORKS, *FAULT TOLERANT COMPUTING,
ALGORITHMS, ROUTING, CIRCUITS, SWITCHING, GRAPHS,
MULTIPROCESSORS, COMPUTER ARCHITECTURE, DATA LINKS,
CIRCUIT INTERCONNECTIONS, REPRINTS

IDENTIFIERS: (U) Data buses, PE61102F, WUAFOSR2304A2

IDENTIFIERS: (U) Minimum mean squared error estimation,
WUAFOSR2304A5, PE61102F

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STANFORD UNIV CA INFORMATION SYSTEMS LAB

NONUNIFORM, TRANSMISSION LINES, ORTHOGONALITY,
POLYNOMIALS, PHYSICAL PROPERTIES, DIFFERENTIAL EQUATIONS,
KERNEL FUNCTIONS, MATHEMATICAL FILTERS

(U) On Mappings between Covariance Matrices and Physical Systems.

DESCRIPTIVE NOTE: Scientific rept..

JUL 84 7P

PERSONAL AUTHORS: Kailath, T. ; Lev-Ari, H. ;

CONTRACT NO. DAAG29-83-K-0028, AFOSR-83-0228

MONITOR: ARO, AFOSR
19878.37-MA, TR-85-0760

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in AMS Summer Research Conference, Jul 84.

ABSTRACT: (U) In different contexts, several authors have established biunique mappings between positive definite Toeplitz kernels (or operators) and self-adjoint second-order differential equations describing physical systems such as vibrating strings and nonuniform transmission lines. This report shows here that to get in some sense a more complete picture of this mapping, it is necessary to extend it to mapping between families of non-Toeplitz operators and classes of physical systems. Each family contains a Toeplitz operator and all operators congruent to it in a certain sense; correspondingly, one adjoins different boundary conditions to the physical system associated with the Toeplitz operator. It is noted that the concept of displacement structure of operators is naturally associated with the above results. Also that the generalized mapping leads to new classification of positive definite operators into 3 distinct classes, to generalizations of orthogonal polynomials and to new Christoffel-Darboux formulas for fast algorithms for operator factorization, and to efficient new implementation for prediction and estimation filters. (Author)

DESCRIPTORS: (U) *MAPPING *OPERATORS(MATHEMATICS), COVARIANCE, MATRICES(MATHEMATICS), ESTIMATES, FILTERS, CLASSIFICATION, OPERATORS(PERSONNEL), PHYSICAL PROPERTIES, VIBRATION, BOUNDARIES, DISPLACEMENT, ALGORITHMS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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TEXAS UNIV AT AUSTIN

*QUANTIZATION, ALGORITHMS, APPROXIMATION(MATHEMATICS),
COMMUNICATION AND RADIO SYSTEMS, COMPUTATIONS, DIGITAL
SYSTEMS, ELECTRICAL ENGINEERING, MACHINES, MICROCOMPUTERS,
NUMERICAL ANALYSIS, OPTIMIZATION, REPRINTS, SIGNAL
PROCESSING, SYMMETRY

(U) A Simple Approximation for Minimum Mean-Square Error
Symmetric Uniform Quantization.

DESCRIPTIVE NOTE: Rept. for 1 Oct 80-30 Sep 85.

APR 84 6P

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

PERSONAL AUTHORS: Lu, F. S.; Wise, G. L.;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0785

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Communications, vCOM-32 n4 p470-474 Apr 84.

ABSTRACT: (U) Although the processing of digital signals occupies a dominant role in modern communication systems, physical signals are generally analog in nature; hence, and effective interface between the analog and digital systems is of crucial importance in signal processing. Quantization is the essential mechanism of analog-to-digital conversion. A great deal of research has been involved with various aspects of the design of optimal quantizers, most of it resulting in a considerable amount of digital computation. In fact, some investigators have published tables presenting quantizer characteristics for various numbers of quantization levels. For implementation on small machines, such as microcomputers which are becoming increasingly popular in modern signal processing, less complicated algorithms are particularly desirable. This paper considers quite simple approximations for the optimal symmetric uniform quantization of random inputs with some different uniform quantization of random inputs with some different distributions. Additional keywords: Reprints; Numerical analysis; Charts; Tables(data); Electrical engineering.

DESCRIPTORS: (U) *ANALOG TO DIGITAL CONVERTERS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK15N

AD-A160 091 20/13

RENSELAER OBSERVATORY TROY N Y

(U) Temporal and Spatial Chaos in a van der Waals Fluid
Due to Periodic Thermal Fluctuations,

85 24P

PERSONAL AUTHORS: Stemrod, M. ; Marsden, J. E. ;

CONTRACT NO. AFOSR-81-0172, DE-AT03-AZER12097

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0842

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Applied
Mathematics, v6 p135-158 1985.

ABSTRACT: (U) The Mel'nikov technique is applied to
prove the existence of deterministic chaos in two
problems for a van der Waals fluid. The first problem
shows that temporal chaos results as a result of small
time periodic fluctuations about a subcritical
temperature when the fluid is initially quenched in the
unstable spinodal region. The second problem shows that
spatial chaos arises from small spatially periodic
fluctuations in an infinite tube of fluid if the ambient
pressure is appropriately chosen. Keywords: Mel'nikov
technique; deterministic chaos; van der Waals fluid;
Reprints.

DESCRIPTORS: (U) *ENTROPY, *STATISTICAL MECHANICS,
PRESSURE, PERIODIC VARIATIONS, *FLUIDS, TUBES, REPRINTS

IDENTIFIERS: (U) Chaos, Van Der Waals Forces, Spinodal
decomposition, PE61102F, WUAFOSR2304A1

AD-A160 087 9/4 12/1

TEXAS UNIV AT AUSTIN

(U) Approximately Optimal Memoryless Detection of Random
Signals in Dependent Noise.

MAR 84 6P

PERSONAL AUTHORS: Halverson, D. R. ; Wise, G. L. ;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0788

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Information Theory, VIT-30 n2 p420-424 Mar 84.

ABSTRACT: (U) We consider discrete timer memoryless
detection of random signals in dependent non-Gaussian
noise, where both the signal and noise belong to a large
class of strong mixing processes, and where a large
amount of dependency may occur between the signal and
noise. The problem of approximating the optimal
nonlinearity under the criterion of asymptotic relative
efficiency is considered, and sufficient conditions are
presented to insure that the loss in performance of the
approximation can be made arbitrarily small. Particular
applications are then made to extensions of existing
results where the approximating nonlinearity is a
quantizer or a polynomial. Keywords include: Signal
detection; Random signals; and Memoryless detection.

DESCRIPTORS: (U) *NOISE, *DETECTION, *NONLINEAR SYSTEMS,
*SIGNAL PROCESSING, *MIXING, TIMING DEVICES, SIGNALS,
POLYNOMIALS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 080 CONTINUED

AD-A160 080 7/5 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Dynamics of Radical Pair Reactions in Micelles,

AUG 85 7P

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

PERSONAL AUTHORS: Gould, I. R. ; Zimmt, M. B. ; Turro, N. J. ;
Baretz, B. H. ; Lehr, G. F. ;

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-0850

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical
Society, v107 n16 p4607-4612, 7 Aug 85.

ABSTRACT: (U) The time-resolved behavior of see-phenethyl, cumyl, and diphenylmethyl radicals as radical pairs solubilized in micelles has been observed using pulsed laser photolysis. The decay of the miscellized radical pairs consists of a fast component (20-2000 X .00000001/sm attributed to reaction within the germinate pair, and a slow component (2000 X .00000001/s), attributed to react ions from random encounters of radicals. The extent of germinate pair reaction (micellar cage reaction) depends upon the competition between that rate constants for reaction and diffusive separation. The rate constants for the reaction and diffusion processes are determined and the nature of these processes is discussed. A correlation is found between the extent of fast decay observed in the time-resolved experiments and the extent of cage reaction determined from steady-state photolysis. Originator supplied keywords include: magnetic field effects; time-resolved photochemistry.

DESCRIPTORS: (U) *CHEMICAL RADICALS, *PHOTOLYSIS, COLLOIDS, CONSTANTS, DECAY, DIFFUSION, DYNAMICS, IONS, MAGNETIC FIELDS, MAGNETIC PROPERTIES, PHOTOCHEMICAL REACTIONS, PULSED LASERS, RATES, STEADY STATE, TIME, METHYL RADICALS, PHENYL RADICALS, REACTION KINETICS, REPRINTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 074 12/1

AD-A160 073 9/4 12/1

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

TEXAS UNIV AT AUSTIN

(U) A Note on the Convergence of the Multigrad V-Cycle.

(U) A Result on Neglecting Dependence in Signal Detection.

85 16P

NOV 84 5P

PERSONAL AUTHORS: Parter, S. V. ;

PERSONAL AUTHORS: Halverson, D. R. ; Wise, G. L. ;

CONTRACT NO. AFOSR-82-0275

CONTRACT NO. AFOSR-81-0047, AFOSR-82-0033

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A3

TASK NO. A5

MONITOR: AFOSR
TR-85-0798

MONITOR: AFOSR
TR-85-0788

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Mathematics and Computation, v17 p137-151 1985.

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, VIT-30 n6 p856-859 Nov 84.

ABSTRACT: (U) Several recent papers have discussed the convergence of the multigrad V-cycle. In particular there are several results for the symmetric case: where the numbers of smoothings before the fine-to-coarse transfer and after the coarse-to-fine transfer are the same. In most instances, the smoother $H = I - 1/E A$ has been limited to the case where E is positive definite and the eigenvalues h of H satisfy $0 < h < 1$. This reprint extends these results to asymmetric V-cycles and the case where $-b < h < 1$ or $h < 1$ with $0 < b < 1$. (Author)

ABSTRACT: (U) The role of weak dependence between observed samples is investigated in the detection of time varying signals in noise, with the goal of establishing quantitative conditions for when the dependency can be ignored. A result is presented that allows bounding the variation in false-alarm rate and detection probability induced by ignoring the dependency. This result is applied to the case of stationary Gaussian noise, and it is shown that the dependency can be ignored if the noise autocorrelation decreases sufficiently fast. In fact, a bound on the variation in false-alarm rate and detection probability is linked to the rate of descent of the noise autocorrelation through an expression that can be easily evaluated. Keywords include: Signal detection and Statistical dependence. (Reprints)

DESCRIPTORS: (U) *EIGENVALUES, *CONVERGENCE, SYMMETRY, LIMITATIONS, REPRINTS

DESCRIPTORS: (U) *DETECTION, *FALSE ALARMS, *GAUSSIAN NOISE, RATES, AUTOCORRELATION, NOISE, LOW STRENGTH, STATIONARY, PROBABILITY, LINKAGES, REPRINTS, SIGNALS, TIME SIGNALS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A3

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 071 12/1

MARYLAND UNIV COLLEGE PARK

(U) Data - Flow Algorithms for Parallel Matrix Computations.

AUG 85 15P

PERSONAL AUTHORS: O'Leary, D. P. ; Stewart, G. W. ;

CONTRACT NO. AFOSR-82-0078

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0797

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Communications of the ACM,
v28 n8 p840-853 Aug 85.

ABSTRACT: (U) This document develops some algorithms and tools for solving matrix problems on parallel processing computers. Operations are synchronized through data-flow alone, which makes global synchronization unnecessary and enables the algorithms to be implemented on machines with very simple operating systems and communication protocols. As examples, the authors present algorithms that form the main modules for solving Liapounov matrix equations. They compare this approach to wave front array processors and systolic arrays, and note its advantages in handling missed problems, in evaluating variations of algorithms or architectures, in moving algorithms from system to system, and in debugging parallel algorithms on sequential machines. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *PARALLEL PROCESSING, *PROBLEM SOLVING, *MATRICES(MATHEMATICS), DEBUGGING(COMPUTERS), GLOBAL, SYNCHRONIZATION(ELECTRONICS), COMPUTERS, COMPUTER ARCHITECTURE, FLOW, MACHINES, SEQUENCES, ARRAYS, PROCESSING EQUIPMENT, WAVEFRONTS, COMPUTATIONS

IDENTIFIERS: (U) Liapounov matrix equations, PE61102F, WJAFOSR2304A3

AD-A160 071

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AD-A160 070 12/1

ILLINOIS UNIV AT URBANA DEPT OF COMPUTER SCIENCE

(U) Right Half Plane Poles and Zeros and Design,

JUN 85 12P

PERSONAL AUTHORS: Freudenberg, J. S. ; Looze, D. P. ;

CONTRACT NO. AFOSR-78-3633

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0772

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, VAC-30 n6 p555-565 Jun 85.

ABSTRACT: (U) This reprint expresses limitations imposed by right half plane poles and zeros of the open-loop system directly in terms of the sensitivity and complementary sensitivity functions or the closed-loop system. The limitations are determined by integral relationships which must be satisfied by these functions. The integral relationships are interpreted in the context of feedback designs. Additional keywords: Bodes integral theorem; transfer functions. (Author)

DESCRIPTORS: (U) *OPEN LOOP SYSTEMS, *TRANSFER FUNCTIONS, *INTEGRATION, FEEDBACK, SENSITIVITY, FUNCTIONS, REPRINTS

IDENTIFIERS: (U) Bodes integral theorem, *Contour integration, PE61102F, WJAFOSR2304A1

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AD-A160 069 12/1 9/4 9/3 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N AD-A160 067 12/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Multidimensional Maximum Entropy Covariance Extension,

(U) An Efficient Exact-Least-Squares Fractionally Spaced Equalizer Using Intersymbol Interpolation.

MAR 85 5P

PERSONAL AUTHORS: Lev-Ari, H. ;

DESCRIPTIVE NOTE: Scientific rept.,

CONTRACT NO. AFOSR-83-0228

SEP 84 15P

PROJECT NO. 2304

PERSONAL AUTHORS: Cloffi, J. M. ; Kailath, T. ;

TASK NO. A6

CONTRACT NO. DAAG29-79-C-0215, F49620-79-C-0058

MONITOR: AFOSR TR-85-0757

MONITOR: ARO, AFOSR 16946.53-MA, TR-85-0755

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ICASSP, Tampa, FL, p1-4 Mar 85.

SUPPLEMENTARY NOTE: Pub. in IEEE Jnl. on Selected Areas in Communications, VSAC-2 n5 p743-755 Sep 84.

ABSTRACT: (U) This document shows that the maximum-entropy extension of an arbitrary covariance band of a (nonstationary) multi-dimensional signal must have a banded inverse. Furthermore, it is shown that for one-dimensional signals such banded-inverse covariances are characterized by finite-order autoregressive models. The same kind of model is inadequate for multi-dimensional signals, but it can be used to approximate maximum-entropy covariances. Additional keywords: electrical engineering; stochastic processes. (Author).

DESCRIPTORS: (U) *ELECTRICAL ENGINEERING, *STOCHASTIC PROCESSES, *SIGNALS, SIZES(DIMENSIONS), ONE DIMENSIONAL, SIGNALS, REPRINTS

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A6

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tap-leakage stochastic-gradient algorithms of Gitlin, Meadors, and Weinstein. Finally, simulations are conducted to verify the operation of the new procedure for both the training and decision-directed modes of operation. Additional keywords: Kalman filtering. (Author)

MASSACHUSETTS UNIV AMHERST

(U) Introducing Redundancy into VLSI Designs for Yield and Performance Enhancement.

85 8P

DESCRIPTORS: (U) *LEAST SQUARES METHOD, COMPARISON, MULTICHANNEL, COMPUTATIONS, REQUIREMENTS, INTERPOLATION, INTERSYMBOL INTERFERENCE, TAPS, SEQUENCES, TRAINING, REQUIREMENTS, STORAGE, DATA RATE, SYMBOLS, KALMAN FILTERING, STARTING, TIME, CONVERGENCE, REPRINTS

PERSONAL AUTHORS: Koren, I. ; Pradhan, D. K. ;

CONTRACT NO. AFOSR-84-0052

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0838

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Annual International Symposium on Fault-Tolerant Computing (15th), P330-335, 19-21 Jun 85.

ABSTRACT: (U) New challenges have been brought to fault-tolerant computing research because of developments in IC technology. One emergent area in VLSI designs is development of architectures, built by interconnecting a large number of a few types of elements on a single chip or wafer. Two important topics, related to such VLSI designs, are the focus of this paper: they are yield enhancement and performance improvement. In this paper we present analytical models that evaluate how yield enhancement and performance improvement may both be achieved by introducing redundancy into these VLSI designs. Keywords include: IC technology; and fault-tolerant computing. (Reprints).

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *FAULT TOLERANT COMPUTING, *INTEGRATED CIRCUITS, REDUNDANCY, CHIPS(ELECTRONICS), TOLERANCE, REPRINTS, OPTIMIZATION, YIELD, COMPUTER ARCHITECTURE

IDENTIFIERS: (U) VLSI(Very Large Scale Integration), WUAFOSR2304A2, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 051 9/4 17/2 12/1 AD-A160 051 CONTINUED
TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL ENGINEERING IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F

(U) A Generalized Block Truncation Coding Algorithm for Image Compression,

JUN 84 7P

PERSONAL AUTHORS: Halverson, D. R.; Griswold, N. C.; Wise, G. L.;

CONTRACT NO. AFOSR-82-0033, AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0768

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Acoustics, Speech, and Signal Processing, VASSP-32 n3 p664-668 Jun 84.

ABSTRACT: (U) Block Truncation Coding is a recently developed approach to image compression whose design is specified by the appropriate moment preserving quantizer. This paper shows how the basic Block Truncation Coding algorithm can be generalized to include a family of moment preserving quantizers with the potential for improved performance. It then illustrates by way of example that such improvement is indeed possible from the standpoint of peak signal to noise ratio. There is a subclass of this family of moment preserving quantizers for which practical difficulties in implementation exists; however, the authors show that frequently we can avoid this subclass and still obtain good performance. Additional keywords: Data compression; Image processing; Electrical engineering; Information theory; Reprints. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *IMAGE PROCESSING, *CODING, *INFORMATION THEORY, DATA COMPRESSION, ELECTRICAL ENGINEERING, IMAGES, COMPRESSION, NOISE, PEAK VALUES, RATIOS, REPRINTS, SIGNALS, TRUNCATION

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AD-A160 050 CONTINUED

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

IDENTIFIERS: (U) WJAFOSR2304A6, PE61102F

(U) Orthogonal Digital Filters for VLSI Implementation.

NOV 84 14P

PERSONAL AUTHORS: Rao, S. K. ; Kailath, T. ;

CONTRACT NO. F49620-79-C-0058, DAAG29-79-C-0215

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0754

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Circuits and Systems, VCAS-31 n11 p933-945 Nov 84.

ABSTRACT: (U) In this paper, an algorithm is developed for the realization of any stable, passive digital rational transfer function in a cascaded interconnection of similar processors with only nearest neighbor links. Extremely high throughput rates are shown to be achievable since the realization yields a pipelineable architecture. By appropriately choosing some normalization constants, limit cycle and overflow oscillations can also be eliminated. Experimental evidence is presented to show the low sensitivity of the structure with respect to perturbations of its parameters. The realization algorithm is extremely simple to implement, particularly for Butterworth, Chebyshev, and Elliptic Selective Filters. The procedure presented here is an outgrowth of certain results in stochastic estimation theory, involving in particular, the so-called fast Schur algorithm for lattice filters. Keywords include: orthogonal digital filters; VLSI; and pipelineable architecture. (Reprints).

DESCRIPTORS: (U) *ALGORITHMS, *DIGITAL FILTERS, *STOCHASTIC PROCESSES, *NORMALIZING(STATISTICS), HIGH RATE, LOW LEVEL, SENSITIVITY, ORTHOGONALITY, ESTIMATES, THEORY, CYCLES, LATTICE DYNAMICS, CRYSTAL FILTERS, CONSTANTS, REPRINTS

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AD-A180 049 12/1 AD-A180 048 12/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

TEXAS UNIV AT AUSTIN

(U) On Beamforming in Presence of Multipath,

(U) Some Remarks on the Existence of Optimal Quantizers.

MAR 85 5P

DESCRIPTIVE NOTE: Rept. for 1 Oct 80-30 Sep 85.

PERSONAL AUTHORS: Pautaj,A. ;Kallath,T. ;

DEC 84 5P

CONTRACT NO. DAAG29-81-K-0057, AFOSR-83-0228

PERSONAL AUTHORS: Abaya,E. F. ;Wise,G. L. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-81-0047

TASK NO. A6

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0759

TASK NO. A5

MONITOR: AFOSR
TR-85-0789

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ICASSP, p1-4 Mar 85.

ABSTRACT: (U) We consider a source radiated signal arriving at an array as a group of wavefronts, each having a different angle of arrival and with arbitrary amplitude, phase and inter wavefront correlation. Several such sources may be present and the measurement data is assumed to be corrupted by sensor uncorrelated noise. The task of the beamformer is to make optimal estimates of each source signal of interest by using the information in all the wavefronts generated by the source. The proposed processor begins with no a priori information about the environment and constructs the optimal beamformer by a bootstrapping approach which uses a two tier eigenstructure analysis of the array covariance. We show that this new beamformer has substantial advantages over the usual optimal beamformers and present results of computer simulation carried out to verify its performance. Keywords: beamforming; radiated signal; wavefront correlation; array covariance; and reprints.

DESCRIPTORS: (U) *BEAM FORMING, *ARRAYS, *WAVEFRONTS, ANGLE OF ARRIVAL, COMPUTERIZED SIMULATION, MEASUREMENT, OPTIMIZATION, ESTIMATES, REPRINTS, RADIATION, SIGNALS, SOURCES, COVARIANCE, BEAM FORMING, DETECTORS

IDENTIFIERS: (U) WUAFOSR2304AL, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A160 026 17/3

STANFORD UNIV CA INFORMATION SYSTEMS LAB

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Direction of Arrival Estimation of Eigenstructure Methods with Unknown Sensor Gain and Phase.

(U) Direction of Arrival Estimation for Signals in the Presence of Unknown Noise Fields.

MAR 85 5P

DEC 84 8P

PERSONAL AUTHORS: Paulraj,A.;Kailath,T.;

PERSONAL AUTHORS: Paulraj,A.;Shan,T. J.;Kailath,T.;

CONTRACT NO. F49620-79-C-0058

CONTRACT NO. AFOSR-83-0228

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A6

TASK NO. A6

MONITOR: AFOSR TR-85-0756

MONITOR: AFOSR TR-85-0758

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Direction of arrival estimation by eigenstructure methods requires knowledge of the array covariance matrix and an exact characterization of the array in terms of geometry, sensor gain and phase, etc. It often happens that the actual in terms of geometry, sensor gain and phase, etc. It often happens that the actual sensor gain and phase are perturbed from their assumed nominal values. If eigenstructure methods are applied with incorrect sensor parameters, the method essentially breaks down or at best gives poor results. We propose a new approach which uses information in the observed covariance matrix to correct for these effects. This method yields substantially improved performance, a fact illustrated by the results of computer simulations. Keywords include: Direction of arrival; Eigenstructure methods; Sensor gain; and Array covariance.

DESCRIPTORS: (U) *ARRAYS, *DETECTORS, *ARRIVAL, COVARIANCE, COMPUTERIZED SIMULATION, GAIN, ESTIMATES, GEOMETRY

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A6

DESCRIPTORS: (U) *NOISE, *DETECTORS, *ARRIVAL, *WAVEFRONTS, ALGORITHMS, ESTIMATES, INVARIANCE, MEASUREMENT, ARRAYS, COVARIANCE, COMPUTERIZED SIMULATION, ACOUSTIC FIELDS, NOISE, REPRINTS, SIGNALS

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A6

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AD-A160 026

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SUPPLEMENTARY NOTE: Pub. in International Conference on Computer, Signal Processing, Dec 84.

ABSTRACT: (U) The usual model assumed in eigenstructure methods for direction of arrival estimation of signal wavefronts is that the additive noise is spatial white i. e., of equal power and uncorrelated from sensor to sensor. The situation when the noise is non white but has a known covariance can also be handled by prewhitening. However, there are no techniques presently available to deal with noise that has an unknown covariance. In this paper, we propose a solution to this problem for the case when we can rely on the invariance of the noise field under two measurements of the array covariance. Some interesting applications of these methods are discussed. Results of computer simulations carried out to verify the performance of this algorithm are also presented. Keywords include: Direction of arrival, Unknown noise fields; Eigenstructure methods; Array covariance. (Reprints)

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 018 9/2

AD-A160 016 12/1

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Characterizing Software with Objective Measurements.

(U) The Strong Consistency of Error Probability Estimates in NN Discrimination.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 107P

OCT 84 21P

PERSONAL AUTHORS: Hutchens, D. H. ;

PERSONAL AUTHORS: Bai, Z. D. ;

REPORT NO. TR-1504

REPORT NO. TR-84-43

CONTRACT NO. F49620-80-C-001

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A2

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0804

TR-85-0807

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This thesis reports on a series of experimental studies performed to determine possible uses of objective software measurements in characterizing and evaluating software. This work revolves around two main themes. The first theme addresses the usefulness of metrics in evaluating the quality of software, particularly as it is related to the errors or changes required during development. It also contains information about how different programming techniques and individual programmers affect the analysis. The second theme addresses program modularity from the perspective of objective software measurements. A technique for automatically determining a hierarchy of modules for a system given its procedure interfaces is presented and evaluated on some class projects and some medium size production software.

DESCRIPTORS: (U) *QUALITY, *COMPUTER PROGRAM RELIABILITY, COMPUTER PROGRAMS, PROGRAMMERS, MEASUREMENT, REPORTS, THESES, TEST AND EVALUATION, INTERFACES, MODULES(ELECTRONICS)

IDENTIFIERS: (U) WJAFOSR2304A2, PE61102F

AD-A160 018

AD-A160 016

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 011 20/9

AD-A160 011 CONTINUED

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

MOLECULES, IONIZATION, MODEL THEORY

(U) Fundamental Processes in Partially Ionized Plasmas.

IDENTIFIERS: (U) WUAFOSR2301A1, PEG1102F

DESCRIPTIVE NOTE: Annual scientific rept. 1 Feb 84-31 Jan 85.

MAR 85 62P

PERSONAL AUTHORS: Kruger, C. H. ; Mitchner, M. ; Self, S. A. ;

CONTRACT NO. AFOSR-83-0108

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0811

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress during the second year of a research program on the Fundamental Processes in Partially Ionized Plasmas conducted in the High Temperature Gasdynamics Laboratory at Stanford University. This research is directed to three major areas: recombination in molecular plasmas, discharge effects (plasma electrode interaction) and interaction of discharges and fluid dynamics. Recombination and ionization are fundamental processes that play a role in nearly all applications and natural phenomena that involve partially ionized plasma. Under the present program, experiments have been designed and theoretical analyses conducted to obtain a better knowledge of the rates of electron recombination on the presence of molecular species. Studies are continuing of the near-electrode region and the processes by which current is transferred between the plasma and the electrodes. The first stage of theoretical modeling of these processes has now been completed and published. A study of the interaction of discharges and fluid dynamics has measured the significant secondary flows caused by the interaction of a magnetic field with a current-carrying plasma.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *RECOMBINATION REACTIONS, CURRENTS, GAS DYNAMICS, HIGH TEMPERATURE, IONIZATION, MAGNETIC FIELDS, ELECTRODES, INTERACTIONS.

AD-A160 011

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 972 12/1

AD-A159 971 9/4 12/1

CALIFORNIA UNIV LOS ANGELES DEPT OF SYSTEM SCIENCE

TEXAS A AND M UNIV COLLEGE STATION

(U) Approximate Stabilizability via the Algebraic Riccati Equation.

(U) Asymptotic Memoryless Discrete-Time Detection of phi-Mixing Noise Signals in phi-Mixing Noise.

DESCRIPTIVE NOTE: Rept. for 21 Oct 81-4 Mar 84,

DESCRIPTIVE NOTE: Rept. for 1 Oct 80-30 Sep 85,

JAN 85 9P

MAR 84 4P

PERSONAL AUTHORS: Levan, N. ;

PERSONAL AUTHORS: Halverson, D. R. ; Wise, G. L. ;

CONTRACT NO. AFOSR-79-0059

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A6

TASK NO. A5

MONITOR: AFOSR
TR-85-0825

MONITOR: AFOSR
TR-85-0787

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Control and Optimization, v23 n1 p153-160 Jan 85.

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, VIT-30 n2 p415-417 Mar 84.

ABSTRACT: (U) This reprint studies stabilizability of Hilbert space C sub o semigroups by means a of state feedback involving a solution of the algebraic Riccati equation. The notion of approximate stability is introduced and it is shown that stabilizability in this case is, in general, only approximate in the sense that the feedback semigroup is stable on a dense subspace instead of on the whole space. (Author)

ABSTRACT: (U) This reprint considers the design of memoryless discrete-time detectors for a phi-mixing signal in phi-mixing noise, where a large degree of dependency may exist between the signal and the noise. The fidelity criterion is taken to be the asymptotic relative efficiency, and it is shown that with this fidelity criterion the nonlinearity in the optimal detector can be found as the solution of an integral equation in which knowledge of only the second-order statistics of the random processes involved is required. Additional keywords: signal detection; corrupting noise; information theory. (Author)

DESCRIPTORS: (U) *HILBERT SPACE, *STABILIZATION, ALGEBRA, RICCATI EQUATION, STABILITY, FEEDBACK, APPROXIMATION(MATHEMATICS), REPRINTS

IDENTIFIERS: (U) Semigroups(Mathematics), PE61102F, WUAFOSR2304A6

DESCRIPTORS: (U) *DETECTION, *INFORMATION THEORY, *NONLINEAR SYSTEMS, DETECTORS, DISCRETE DISTRIBUTION, INTEGRAL EQUATIONS, OPTIMIZATION, SIGNALS, TIME

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A159 972

AD-A159 971

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 970 7/4 20/8

AD-A159 970 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Rotational Relaxation in the H₂CO A 1A₂ State by
Transient Gain Spectroscopy.

JUN 85 3P

PERSONAL AUTHORS: Vaccaro, P. H. ; Redington, R. L. ; Schmidt,
J. ; Kinsey, J. L. ; Field, R. W. ;

CONTRACT NO. F49620-83-C-0010

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-85-0848

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v82
n12 p1606-1607, 15 Jun 85.

ABSTRACT: (U) The H₂CO A_{1A₂} electronic state is among the first for which photophysical and photochemical processes have been examined at the level of individual rovibronic eigenstates. Of primary importance are the mechanisms responsible for the collision-induced and collision-free decay of specific rotation-vibration levels. This Communication reports the use of a new technique, Transient Gain Spectroscopy (TGS), as a probe of collision-induced processes in H₂CO A superscript 1 A sub 2 4 superscript 1. The results provide the first direct experimental evidence that the curvature in Stern-Volmer plots of undispersed fluorescence data is due to collisional transfer of population from the initially prepared S sub 1 rovibronic level to adjacent levels having radically different collision-free lifetimes. We have shown the utility of Transient Gain Spectroscopy in a system where unimolecular nonradiative processes compete with radiative and collisional depopulation processes. The limitation imposed by the restricted tunability (approximately 7GHz) of the argon ion probe beam was recently eliminated by using a cw dye laser, with polarization detection, as a probe of A state dynamics. In a related experiment, utilizing SEP with two pulsed lasers and a cw polarization probe, we have

measured the collisional depopulation rates of specific rotation-vibration levels, having approximately 1200/cm of vibrational excitation, in the H₂CO A superscript 1 A sub 1 state. Originator supplied keywords include: Laser Spectroscopy, Formaldehyde, Rotational Energy Transfer.

DESCRIPTORS: (U) *ELECTRONIC STATES, *MOLECULAR ENERGY LEVELS, *SPECTROSCOPY, *FORMALDEHYDE, REACTION KINETICS, ARGON, ION BEAMS, PROBES, COLLISIONS, FLUORESCENCE, POPULATION(MATHEMATICS), TRANSFER, CONTINUOUS WAVE LASERS, PHOTOCHEMICAL REACTIONS, PHYSICAL PROPERTIES, POLARIZATION, RELAXATION, ROTATION, MOLECULES, ENERGY TRANSFER, DYNAMICS, PULSED LASERS, EXCITATION, VIBRATION, REPRINTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B1

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AD-A159 970

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 969 4/2 AD-A159 968 17/1 20/1

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Convective Cloud Climatologies Constructed from Satellite Imagery.

(U) A Fast Algorithm Solution of the Inverse Problem for a Layered Acoustic Medium Probed by Spherical Harmonic Waves.

MAR 85 14P

PERSONAL AUTHORS: Klitch, M. A. ; Weaver, J. F. ; Kelly, F. P. ; Vonder Haar, T. H. ;

AUG 85 10P

PERSONAL AUTHORS: Yagle, A. E. ; Levy, B. C. ;

CONTRACT NO. AFOSR-82-0162

CONTRACT NO. AFOSR-82-0135

PROJECT NO. 2310

PROJECT NO. 2304

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR TR-85-0843

MONITOR: AFOSR TR-85-0841

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Composites of satellite imagery are constructed for various hours and various summer months on Colorado State University's interactive processing system. Simple averages of visible wavelength imagery are considered as well as averages of bispectrally classified data. The classified images use both visible wavelength and infrared wavelength data to identify probable deep convection. Results reveal the diurnal convective cycle over the Rocky Mountains and high plains in greater detail than has been previously possible. The convective frequency composites are compared with precipitation averages and differences between normal versus severe weather patterns are discussed. Practical forecasting applications for the composited data are suggested and discussed. (Author)

DESCRIPTORS: (U) *CLOUDS, COLORADO, CONVECTION(ATMOSPHERIC), CYCLES, DIURNAL VARIATIONS, FREQUENCY, INFRARED RADIATION, MOUNTAINS, PROBABILITY, IMAGES, ARTIFICIAL SATELLITES, COMPOSITE MATERIALS, CONVECTION, FORECASTING, INTERACTIONS, PROCESSING, MEAN, PRECIPITATION, PATTERNS, STORMS, SUMMER, VISIBLE SPECTRA, CLIMATE, ATMOSPHERIC PRECIPITATION, SATELLITE PHOTOGRAPHY

IDENTIFIERS: (U) PEB1102F, WUAFOSR2310A1

AD-A159 969

AD-A159 968

UNCLASSIFIED

PAGE 02

EVK15N

SUPPLEMENTARY NOTE: Pub. in Jnl. of Acoustical Society of America, v78 n2 p729-737 Aug 85.

ABSTRACT: (U) A continuous layered medium is probed by sinusoidal spherical waves from a point harmonic source, and the reflection response of the medium is measured. By performing this experiment at two different source frequencies, the separate density and sound-speed profiles are recovered. Two experimental configurations are considered: the case in which the inhomogeneous medium is confined between two infinite homogeneous half-spaces and is probed from the upper half space, and the case in which the inhomogeneous medium is bounded above by a free-surface, at which the source is located. Layer-stripping fast algorithm solutions to both of these inverse problems are obtained and illustrated with examples. The algorithms are interpreted physically as constructing distinctions of image sources that simulate the medium response at each depth. Keywords: Sinusoidal spherical waves; Layer-stripping fast algorithms. (Reprints)

DESCRIPTORS: (U) *HARMONIC ANALYSIS, *ACOUSTIC REFLECTION, *SPHERICAL WAVES, ALGORITHMS, SOLUTIONS(GENERAL), INVERSION, ACOUSTICS, LAYERS, HARMONICS, SOURCES, REPRINTS, FREQUENCY, IMAGES, RESPONSE,

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 968 CONTINUED

AD-A159 967 12/1

ACOUSTIC VELOCITY, PROFILES

ILLINOIS UNIV AT CHICAGO CIRCLE

IDENTIFIERS: (U) Inverse problems, PE61102F,
WJAFOSR2304A1

(U) Characterizations and Closure under Convolution of Two
Classes of Multivariate Distributions.

DEC 84 4P

PERSONAL AUTHORS: El-Neueihi, E. ;

CONTRACT NO. AFOSR-80-0170

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-85-0806

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Statistics & Probability
Letters, v2 n6 p333-335 Dec 84.

ABSTRACT: (U) Various multivariate extensions of the
univariate classes of increasing failure rate average
(IRRA) and new better than used (NBU) distributions are
now available. This paper characterizes two of those
classes and utilize the characterizations to study the
closure of the two classes under the fundamental
operation of convolution. Additional keywords: Reprints;
Increasing sets.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *DISTRIBUTION
FUNCTIONS, CONVOLUTION, FAILURE, OPERATION, RATES,
REPRINTS

IDENTIFIERS: (U) IFRA(Increasing Failure Rate Average),
NBU(New Better Than Used), Increasing sets, PE61102F,
WJAFOSR2304K3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 402 17/2 12/1

AD-A159 396

7/4

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Mathematical Problems in Stability, Control and Reliability of Random Access Communication Systems.

(U) Vibrational Excitation of $Li_2(X \ 1 \ \text{Sigma}(+) \ \text{sub } g)$ via Electron or Photon Excitation of the $A \ 1 \ \text{Sigma}(+) \ \text{sub } u$ and $B \ 1 \ \text{pi} \ \text{Sub } u$ States.

DESCRIPTIVE NOTE: Annual rept. no. 11, 15 May 84-14 May 85.

MAR 85

5P

JUN 85

3P

PERSONAL AUTHORS: Wadehra, J. M. ; Michels, H. H. ;

PERSONAL AUTHORS: Rosenkrantz, W. A. ;

REPORT NO. UTRC/926533-4

CONTRACT NO. AFOSR-82-0167

CONTRACT NO. F49620-83-C-0094

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. A5

TASK NO. A7

MONITOR: AFOSR
TR-85-0715

MONITOR: AFOSR
TR-85-0647

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Current research is focused on three problems: (1) stability analysis of the exponential back-off protocol, (2) a diffusion approximation for the steady state distribution of the slotted ALOHA protocol, and (3) a Poisson limit theorem for a load balancing protocol. Work began on applying Stochastic Catastrophe Theory to the study of the exponential back-off protocol when there are a finite number of users. Work is also planned on a theoretical analysis of the diffusion approximation to the slotted ALOHA protocol. (Author).

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *POISSON DENSITY FUNCTIONS, DIFFUSION, DISTRIBUTION, LIMITATIONS, MATHEMATICS, RANDOM ACCESS COMPUTER STORAGE, RELIABILITY, STABILITY, STEADY STATE, THEOREMS, THEORY

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v114 n4 p380-383, 8 Mar 85.

ABSTRACT: (U) Cross sections for vibrational excitation (VE) of the $X \ 1 \ \text{Sigma}(+) \ \text{sub } g$ state of Li_2 via formation of the excited $A \ 1 \ \text{Sigma}(+) \ \text{sub } u$ or $B \ 1 \ \text{pi} \ \text{sub } u$ electronic states are reported. For VE through the $A \ 1 \ \text{Sigma}(+) \ \text{sub } u$ state, the cross sections are nearly constant for forming $X \ 1 \ \text{Sigma}(+) \ \text{sub } g$ (3 approx. $< nu$ approx. < 9) via electron collisional excitation. For photon pumping (800 approx. $< lambda$ approx. $< 700 \text{ nm}$) of the $A \ 1 \ \text{Sigma}(+) \ \text{sub } u$ state, levels $nu < or = 9$ are predominantly formed. VE via the $B \ 1 \ \text{pi} \ \text{sub } u$ state has a lower probability.

DESCRIPTORS: (U) *LITHIUM, *ELECTRONIC STATES, *VIBRATIONAL SPECTRA, CROSS SECTIONS, EXCITATION, PHOTONS, POTENTIAL ENERGY, ENERGY TRANSFER, REPRINTS

IDENTIFIERS: (U) WUAFOSR2301A7, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 384 9/1 20/3 17/9

MISSION RESEARCH CORP ALBUQUERQUE NM

AD-A159 252 9/2

MARYLAND UNIV COLLEGE PARK

(U) Millimeter Wave Viricator.

(U) Parallel Matrix Computations.

DESCRIPTIVE NOTE: Final rept. 1 Jan 82-31 Mar 85,

DESCRIPTIVE NOTE: Interim rept. 9 Feb 83-16 May 85.

JUN 85 272P

APR 85 8P

PERSONAL AUTHORS: Sullivan, D. J. ; Voss, D. E. ; Adler, R. J. ; Busby, K. O. ; Bollen, E. M. ;

PERSONAL AUTHORS: Stewart, G. W. ; O'Leary, D. P. ;

REPORT NO. AMRC-R-692

CONTRACT NO. AFOSR-82-0078

CONTRACT NO. F49620-82-C-0014

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. A3

TASK NO. A8

MONITOR: AFOSR TR-85-0695

MONITOR: AFOSR TR-85-0666

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Te millimeter wave viricator as achieved a frequency in excess of 39.9 Ghz and a peak power of the order of 21 kilowatts ($f > \text{or} = 28.35 \text{ Ghz}$) for a pulse duration of as short as 5 ns full width at half maximum. A new moderate voltage, high current density, field emission gun has been tested to a voltage, high current density, field emission gun as been tested to a voltage of 67 kv and an inferred current density of 7 kA/per sq cm. A new compact capacitive voltage monitor, similar to those commonly used in radar modulators, has been developed for short pulse, fast risetime, low to moderate impedance pulse lines. Keywords include: Virtual cathode, Virtual anode; Virtual cathode oscillator; VIRCATOR; Space-charge limit; Space-charge limiting current; Millimeter microwaves; and Spectrometer.

DESCRIPTORS: (U) *FIELD EMISSION, *GUNS, *MODULATORS, TIME WIDTH, MILLIMETER WAVES, PULSE RATE, SHORT PULSES, MONITORS, HIGH DENSITY, PEAK POWER, LIMITATIONS, VOLTAGE, SPACE CHARGE, RADAR, HIGH POWER

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A8

AD-A159 394

AD-A159 252

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EVK15N

ABSTRACT: (U) The purpose of this effort is to develop realistic algorithms for matrix computations on parallel computers. It has been long observed that the usual algorithms of numerical linear algebra contain a great deal of inherent parallelism. For example, if the arithmetic operations that can be performed in parallel in Gaussian elimination are actually so executed, the time to decompose an $n \times n$ matrix is reduced from $cu n^3$ to n only recently, with the emergence of cheap, small microcomputers, has it become feasible to exploit this parallelism on anything but a trivial scale there is under development a parallel system, called ZMOB, consisting of 256 micro-processors connected on a conveyor belt. This belt is so fast and its architecture is such that any two processors can communicate without interfering with the communications of other pairs of processors. Thus the ZMOB is an ideal tool for simulating an arbitrarily connected network of computers. This feature of the ZMOB is particularly useful in investigating parallel matrix algorithms. As was noted above, there is much parallelism in most current matrix algorithms. However, to exploit it, information must be moved from processor to processor. This constitutes the chief bottleneck in parallel matrix algorithms; interconnections between processors are expensive, and in a practical system one can assume only a limited amount of connectivity. The ZMOB provides a means of testing and

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A159 252 CONTINUED AD-A159 241 12/1

comparing different types of interconnections, since all one has to do is use the rich connections provided by the ZMOB conveyor belt.

DESCRIPTORS: (U) *ALGORITHMS, *PARALLEL PROCESSING, ARITHMETIC, COMPUTERS, CONVEYORS, LINEAR ALGEBRA, MICROCOMPUTERS, NUMERICAL ANALYSIS, OPERATION, PARALLEL ORIENTATION, PROCESSING EQUIPMENT, SCALE, TOOLS, COMPUTATIONS

IDENTIFIERS: (U) PEG1102F

NORTH CAROLINA UNIV AT CHARLOTTE

(U) Life Distribution Properties of Devices Subject to a Pure Jump Damage Process,

DEC 84 12P

PERSONAL AUTHORS: Abdel-Hameed, M. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0709

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Probability, v21 n4 p816-825 Dec 84.

ABSTRACT: (U) A device is subject to damage. The damage occurs randomly in time according to a pure jump process. The device has a threshold and it fails once the damage exceeds the threshold. It is shown that life distribution properties of the threshold right tail probability are inherited as corresponding properties of the survival probability, under suitable conditions on the parameters of the damage process. Moreover an optimal replacement problem for such devices is discussed. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, *LIFE EXPECTANCY(SERVICE LIFE), DAMAGE, MARKOV PROCESSES, REPLACEMENT, REPRINTS

IDENTIFIERS: (U) *Pure jump damage process, *Devices, life distributions, PEG1102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 240 12/1

AD-A159 236 9/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

STANFORD UNIV CA

(U) Sampling Designs for Time Series.

(U) Techniques for the Design and Implementation of Highly Reliable Multi-Processing Systems.

85 27P

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-1 Aug 85.

PERSONAL AUTHORS: Cambanis, S. ;

MAY 85 7P

REPORT NO. TR-58

PERSONAL AUTHORS: Luckham, D. C. ;

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. AFOSR-83-0355

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A2

MONITOR: AFOSR
TR-85-0700

MONITOR: AFOSR
TR-85-0693

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Handbook of Statistics, v5 p337-362 1985.

ABSTRACT: (U) In the context of three problems involving time series: the estimation of integrals of random quantities, the estimation of regression coefficients, and the detection of signals in noise, we search for optimal sampling designs of a given sample size and for asymptotically optimal designs. We consider deterministic designs, such as periodic, regular and midpoint sampling, as well as random ones, such as simple random and stratified sampling. We also use either optimal estimators and sufficient statistics, or much simpler estimators and statistics. (Author)

ABSTRACT: (U) During this research period several significant accomplishments were obtained. The completion of implementation of a prototype runtime monitor for detecting deadness errors in Ada tasking was accomplished. The work on runtime monitoring for deadness errors was presented at the IEEE Ada Conference in October 1984, and an invited publication appeared in IEEE Software in March 1985. A new language, called TSL (for Task Sequencing Language) to be used for specifying Ada tasking behavior, was designed and presented at the International Ada Conference in May 1985. (Author)

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, *STATISTICAL SAMPLES, ESTIMATES, LINEAR REGRESSION ANALYSIS, SIGNAL TO NOISE RATIO, REPRINTS

DESCRIPTORS: (U) *MULTIPROCESSORS, *RELIABILITY(ELECTRONICS), COMPUTER PROGRAMS, PROTOTYPES, PROGRAMMING LANGUAGES, DEBUGGING(COMPUTERS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

IDENTIFIERS: (U) PE1102F, WUAFOSR2304A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A159 202 CONTINUED

AD-A159 202 11/2

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD INORGANIC
MATERIALS DIV 4200464

(U) Structural Reliability of Brittle Materials at High
Temperatures.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 83-30 Sep 84,

DEC 84 199P

PERSONAL AUTHORS: Wiederhorn, S. M. ; Tighe, N. J. ; Chuang, T.
J. ; Hardman-Rhyme, K. A. ; Hockey, B. J. ;

CONTRACT NO. AFOSR-ISSA-84-00013

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-85-0686

UNCLASSIFIED REPORT

ABSTRACT: (U) Work during the past year was conducted on yttria-doped hot-pressed silicon nitride, alpha-silicon carbide, and a glass-bonded aluminum oxide. The first two materials were selected for study because of their potential for high temperature structural application, whereas the latter material was selected as a model material to investigate the creep-rupture behavior of two phase ceramics. During the past year our work emphasized the microstructural analysis of these materials and the effect of microstructure on component lifetime. A study has also been started on the effect of microstructure on component lifetime. A study has also been started on the effect of temperature on the strength of a commercial grade of partially stabilized zirconium oxide. The brief summary presented below gives our major findings on each of these materials. Full papers for each study are included in this report. (Author)

DESCRIPTORS: (U) *CERAMIC MATERIALS, STRENGTH(MECHANICS)
SILICON NITRIDES, SILICON CARBIDES, DOPING, YTTRIUM,
ALUMINUM OXIDES, MICROSTRUCTURE, THERMAL PROPERTIES, HIGH
TEMPERATURE, CREEP, RUPTURE, ZIRCONIUM OXIDES

IDENTIFIERS: (U) PE61102F, WJAFQR2306A2, LPN-NBS-

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5
PROCESSES

(U) Linear Stochastic Differential Equations on the Dual
of a Countably Hilbert Nuclear Space with Applications
to Neurophysiology.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

JUN 85 218P

PERSONAL AUTHORS: Christensen, S. K. ;

REPORT NO. TR-104

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0705

UNCLASSIFIED REPORT

ABSTRACT: (U) Properties of the Ornstein-Uhlenbeck on
the dual of a nuclear space are derived; stationarity and
existence of unique invariant measure is proved. Radon-
Nikodym derivative exhibited and the OU process is
investigated for flicker noise. Existence and uniqueness
of solutions to linear stochastic differential equations
on the dual of a nuclear space is established, and general
conditions for the weak convergence on Skorohod space of
solutions are given. Moreover, solutions are shown to be
CADLAG semimartingales (for appropriate initial
conditions). The results are applicable to solving
stochastic partial differential equations. Finally, the
results are applied to giving a rigorous representation
and solutions of models in neurophysiology as well as to
deriving explicit results for the weak convergence of
these solutions. (Author)

DESCRIPTORS: (U) *LINEAR DIFFERENTIAL EQUATIONS,
*STOCHASTIC PROCESSES, NEUROPHYSIOLOGY, INVARIANCE, WEAK
CONVERGENCE, FLICKER, MATHEMATICAL MODELS, HILBERT SPACE,
NOISE, SOLUTIONS(GENERAL)

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TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

(U) Research to Study Specific, Important Problems in Distributed Systems and Propose Solutions for Them.

DESCRIPTIVE NOTE: Final rept. 14 Jun 81-15 Jun 85,

JUL 85 174P

PERSONAL AUTHORS: Chandy, K. M. ; Misra, J. ;

CONTRACT NO. AFOSR-81-0205

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0732

UNCLASSIFIED REPORT

ABSTRACT: (U) Work has resulted in a number of significant algorithms for distributed systems. Notable among these are, (1) Distributed Snapshots: which allows for the construction of a consistent global state, (2) The Drinking Philosophers Problem: which captures the essence of many conflict resolution problems, (3) Detection of Quiescent Properties: which allows detection of many 'stable properties' without taking a snapshot and (4) Distributed Search: which allows for the solution of dynamic programming problems on a message passing architecture. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *DISTRIBUTED DATA PROCESSING, CONFLICT, CONSISTENCY, DETECTION DISTRIBUTION, DYNAMIC PROGRAMMING, GLOBAL, PHOTOGRAPHS, PROBLEM SOLVING, RESOLUTION, SEARCHING, STABILITY, SOLUTIONS(GENERAL), COMPUTER ARCHITECTURE

IDENTIFIERS: (U) PE60112F, WJAFOSR2304A2

AD-A159 182 12/1

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Life Distribution Properties of Devices Subject to a Levy Wear Process.

NOV 84 11P

PERSONAL AUTHORS: Abdel-Hameed, M. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0710

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematics of Operations Research, v9 n4 p806-814 Nov 84.

ABSTRACT: (U) Assume that a device is subject to wear. Over time the wear is assumed to be an increasing Levy process. Suppose the device has a threshold Y with right-tail probability G . Let Z be the failure time of the device and F sub x be its survival probability given that X sub $0 = x$. It is shown that life distribution properties of G are inherited as corresponding properties of F sub x . Optimal replacement policies for such devices are discussed for suitably chosen cost functions when G is absolutely continuous on R^+ with a bounded failure rate. Keywords: Levy process, bounded failure rate, right tail probability.

DESCRIPTORS: (U) *COMPUTATIONS, *LIFE EXPECTANCY(SERVICE LIFE), COSTS, FAILURE, FUNCTIONS, POLICIES, PROBABILITY, RATES, SURVIVAL(GENERAL), TIME, WEAR, REPLACEMENT, REPRINTS

IDENTIFIERS: (U) Levy wear process, PE61102F, WJAFOSR2304A5

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

Wiener integrals in one of these Hilbert spaces and can be represented as an operator valued stochastic integral of the Ito type. (Author)

(U) Product Stochastic Measures, Multiple Stochastic Integrals and Their Extensions to Nuclear Space Valued Processes.

DESCRIPTORS: (U) *INTEGRALS, *STOCHASTIC PROCESSES, HILBERT SPACE, SCATTERING, DECOMPOSITION, SYMMETRY, TENSORS, OPERATORS(MATHEMATICS)

DESCRIPTIVE NOTE: Technical rept. 1 Sep 84-31 Aug 85.

JUN 85 195P

IDENTIFIERS: (U) Nuclear spaces, PE81102F, WUAFOSR2304AS

PERSONAL AUTHORS: Perez-Abreu C., V. M. ;

REPORT NO. TR-107

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.

ABSTRACT: (U) A theory of L sub 2 valued product stochastic measures of non-identically distributed L sub 2 - independently scattered measures is developed using concepts of symmetric tensor product Hilbert spaces. Applying the theory of vector valued measures we construct multiple stochastic integrals with respect to the product stochastic measures. A clear relationship between the theories of vector valued measures and multiple stochastic integrals is established. This work is related to the work by D.D. Engel (1982) who gives a different approach to the construction of product stochastic measures. The two approaches are compared. The second part of the work deals with multiple Wiener integrals and nonlinear functionals of a ϕ - valued Wiener process W sub t where ϕ is the dual of a Countably Hilbert Nuclear Space. We obtain the Wiener decomposition of the space of ϕ -valued nonlinear functionals as an inductive limit of appropriate Hilbert spaces. It is shown that every ϕ - valued nonlinear functional admits an expansion in terms of multiple

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Hitting a Boundary Point by Diffusions in the Closed Half Space.

(U) Strengthening and Strength Uniformity of Structural Ceramics.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 84-31 Aug 85.

DESCRIPTIVE NOTE: Final rept. 1 Feb 81-31 Jan 85.

JUN 85

17P

APR 85

110P

PERSONAL AUTHORS: Ramasubramanian, S. ;

PERSONAL AUTHORS: Lange, F. F. ; Marshall, D. B. ;

REPORT NO. TR-108

REPORT NO. SC5295.4FR

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. F49620-81-C-0036

PROJECT NO. 2304

PROJECT NO. 2306

TASK NO. A5

TASK NO. A2

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0703

TR-85-0731

UNCLASSIFIED REPORT

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ABSTRACT: (U) It is known that a Brownian motion in the unit sphere, with normal reflection at the boundary, does not hit a specified point on the boundary. The aim of this article is to prove that a non-degenerate diffusion in the closed half space, with certain Wentzell-type boundary conditions, does not hit a point on the boundary specified in advanced. We also give an application to a boundary value problem. Additional keywords: Stochastic differential equations; Submartingales; and Matrices(mathematics).

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, DIFFERENTIAL EQUATIONS, SPHERES, BROWNIAN MOTION, BOUNDARIES, MATRICES(MATHEMATICS), STOCHASTIC PROCESSES

IDENTIFIERS: (U) Submartingales, PE61102F, WJAFOSR2304A5

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AD-A159 168 12/1

IDENTIFIERS: (U) PEG1102F, WJAFOSR2306A2

WASHINGTON STATE UNIV PULLMAN

(U) / Rapidly Convergent Algorithms for Nonsmooth Optimization.

DESCRIPTIVE NOTE: Annual scientific rept. 15 Jul 84-14 Jul 85.

JUL 85 6P

PERSONAL AUTHORS: Mifflin, R. ;

CONTRACT NO. AFOSR-83-0210

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-85-0713

UNCLASSIFIED REPORT

ABSTRACT: (U) This research has led to new developments for solving nonlinear optimization problems involving functions that are not everywhere differentiable and/or are implicitly defined, such as those that arise from dual formulations of optimization models. A rapidly convergent, both in the theoretical and the practical sense, algorithm has been developed for the single variable case where generalized derivatives are available. It is being extended to the case where only function values are known. Some of the single variable results, including the concept of better than linear convergence, have been extended to the multivariable case. In order to solve efficiently the particular quadratic programming subproblems generated by the n-variable method a specialized OP algorithm has been developed. Additional keywords: Nondifferential programming; FORTRAN. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *OPTIMIZATION, ALGORITHMS, FORMULATIONS, CONVERGENCE, FUNCTIONS, VALUE, QUADRATIC PROGRAMMING, NONLINEAR SYSTEMS, PROBLEM SOLVING, FORTRAN, MULTIVARIATE ANALYSIS, VARIABLES, MATHEMATICAL MODELS

IDENTIFIERS: (U) Nondifferential programming

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AD-A159 163 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Determining the Predictor of Non-Full-Rank Multivariate Stationary Random Processes.

(U) Non-Uniform Bounds of Normal Approximation for Finite-Population U-Statistics.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

MAR 85 20P

JUL 85 38P

PERSONAL AUTHORS: Miamee, A. G. ;

PERSONAL AUTHORS: Baiqi, M. ; Lincheng, Z. ;

REPORT NO. TR-96

REPORT NO. TR-85-26

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0682

MONITOR: AFOSR
TR-85-0698

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Algorithms for determining the generating function and the predictor for some non-full-rank multivariate stationary stochastic process are obtained. In fact it is shown that the well known algorithms given by Wiener and Masani (1958) for the full-rank case, are valid in certain non-full-rank cases exactly in the same form. Additional keywords: linear predictor; operators (mathematics). (Author)

SUPPLEMENTARY NOTE: Prepared in cooperation with University of Science and Technology (China).

DESCRIPTORS: (U) *ALGORITHMS, *MATHEMATICAL PREDICTION, FUNCTIONS, MULTIVARIATE ANALYSIS, STATIONARY, STOCHASTIC PROCESSES, LINEARITY, OPERATORS(MATHEMATICS)

DESCRIPTORS: (U) *POPULATION(MATHEMATICS), *APPROXIMATION(MATHEMATICS), STATISTICAL ANALYSIS, CONSTANTS, DISTRIBUTION FUNCTIONS, ASYMPTOTIC NORMALITY

IDENTIFIERS: (U) Non-full-rank stochastic processes, PEG1102F, WUAFOSR2304A5

IDENTIFIERS: (U) Borel measurable functions, PEG1102F, WUAFOSR2304A5

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AD-A159 157 12/1

ECODYNAMICS RESEARCH ASSOCIATES INC ALBUQUERQUE NM

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Adaptive Grid Generation Using Elliptic Generating Equations with Precise Coordinate Controls.

(U) Pure Jump Wear Processes: A Review,

DESCRIPTIVE NOTE: Annual rept. 27 Jan 84-15 Aug 85,

83 14P

JUL 85 7P

PERSONAL AUTHORS: Abdel-Hameed, M. ;

PERSONAL AUTHORS: Roache, P. J. ;

CONTRACT NO. AFOSR-80-0245

CONTRACT NO. F49620-84-C-0079

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A3

TASK NO. A5

MONITOR: AFOSR
TR-85-0708

MONITOR: AFOSR
TR-85-0707

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigators are in the final stages of developing a toolkit of symbol manipulation codes for variational grid generation. They will present an invited paper on this work at an AIAA Aerospace Sciences Meeting. They have also discovered an unexpected folding of the grid for a design case using a popular grid generation code. A paper analyzing the problem was presented at the AIAA Computational Fluid Dynamics Meeting in July. The analysis has suggested practical values of relative weighting parameters for use in variational grid generation techniques. A paper has been submitted to the Journal Applied Mathematics and Computation. Additional keywords: grids(coordinates); adaptive systems. (Author)

DESCRIPTORS: (U) *GRIDS(COORDINATES), VARIATIONAL METHODS, ADAPTIVE SYSTEMS, GRIDS, SPACE SCIENCES, ELLIPSES, EQUATIONS, CODING, PARAMETERS, WEIGHTING FUNCTIONS, ADAPTIVE SYSTEMS, COMPUTATIONS, FLUID DYNAMICS, FOLDING, CONTROL, COORDINATES, PRECISION

IDENTIFIERS: (U) *Grid generation techniques, Elliptic generating equations, PE61102F, WJAFOSR2304A3

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EVK15N

SUPPLEMENTARY NOTE: Pub. in Developments in Statistics and Its Applications p3-16 1983.

ABSTRACT: (U) The area of shock models and wear processes has been extensively studied over the past decade. This paper reviews some of the most recent work in the area of damage and wear processes and examines their implications in reliability. Two topics particularly discussed are preservation of life distributions and optimal replacement policies. (Author)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *SHOCK, DAMAGE, WEAR, RELIABILITY, MARKOV PROCESSES, REPRINTS

IDENTIFIERS: (U) *Shock models, Life distributions, Optimal replacement, WJAFOSR2304A5, PE61102F

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AD-A159 155 20/1 20/2 14/2 12/1 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
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LA JOLLA INST CA CENTER FOR THE STUDY OF NONLINEAR DYNAMICS

(U) Theoretical Studies in Nondestructive Evaluation (NDE).

DESCRIPTIVE NOTE: Final rept. 1 Jul 80-14 Feb 84,

APR 85 87P

PERSONAL AUTHORS: West, B. J. ;

REPORT NO. LJI-R-85-318

CONTRACT NO. F49620-81-K-0017

MONITOR: AFOSR
TR-85-0730

DESCRIPTORS: (U) *ACOUSTIC SCATTERING, *ULTRASONICS, ACOUSTIC WAVES, COMPUTATIONS, DENSITY, DISTRIBUTION, GRAIN SIZE, HETEROGENEITY, LIMITATIONS, LINEARITY, NONDESTRUCTIVE TESTING, SCALAR FUNCTIONS, SCALING FACTORS, SCATTERING, SYMMETRY, THEORY, TIME, WAVE PROPAGATION, WAVES, DEFECTS(MATERIALS), POLYCRYSTALLINE, RAYLEIGH SCATTERING, SIMPLE CUBIC LATTICES, STOCHASTIC PROCESSES

IDENTIFIERS: (U) Nondestructive evaluation, Fractals, Stochastic scattering, Scalar wave scattering, Ultrasonic scatterers, Scattering theory, PE61102F

UNCLASSIFIED REPORT

ABSTRACT: (U) A previously developed technique has been used to describe the discrete scattering of scalar waves from defects on a regular simple cubic lattice. The method makes no assumption about the symmetry of the scatterers and therefore can be applied to inhomogeneities of arbitrary shape. The only limitation of the technique is the maximum number of defects one can use to specify the scatter, which in turn is determined by limitations in computation time. The multiple scattering model proposed by Foldy and later extended by Lax was implemented by West and Shlesinger as a means of evaluating the distribution of grains in polycrystalline materials. If the material consists of grains such that the wavelength is much larger than the grain size then the density of scatterers probed by the acoustic wave is unchanged as the frequency is increased, provided that one remains in the Rayleigh scattering domain. If one is in the scattering domain where the wavelength is less than or equal to the grain size, then the density of scatterers increases no more rapidly than the square of the linear scale (a^2) rather than as its cube as it would in the usual situation. This implies that the density of scatterers is a fractal in the stochastic scattering domain. Note also that the surface of a grain can have many scales and may in part be responsible for the fractal behavior observed in the phenomenological expression. Keywords: Scattering theory. The Fractal Dimension of Ultrasonic Scatterers.

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AD-A159 138 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) A Note on N Estimators for the Binomial Distribution.

JUN 85 5P

(U) Extreme Value Theory and Dependence.

PERSONAL AUTHORS: Carroll, R. J. ; Lombard, F. ;

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

CONTRACT NO. F49620-82-C-0009

JUL 85 8P

PROJECT NO. 2304

PERSONAL AUTHORS: Leadbetter, M. R. ;

TASK NO. A5

REPORT NO. TR-109

MONITOR: AFOSR

CONTRACT NO. F49620-82-C-0008

TR-85-0699

PROJECT NO. 2304

UNCLASSIFIED REPORT

TASK NO. A5

SUPPLEMENTARY NOTE: Pub. in the Jnl. of the American Statistical Association, v80 n390 p423-426 Jun 85.

MONITOR: AFOSR
TR-85-0692

ABSTRACT: (U) This document considers k success counts from a binomial distribution with unknown N and success probability p . The author examines the problem of estimating N . By integrating the likelihood for N and p over a beta density for p , they obtain the beta-binomial distribution resulting in stable and reasonably efficient estimators of N , which compare favorably with and are often better than the estimates introduced by Olkin et al.

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *ESTIMATES, STABILITY, MAXIMUM LIKELIHOOD ESTIMATION, METHOD OF MOMENTS, NUMERICAL METHODS AND PROCEDURES, REPRINTS

IDENTIFIERS: (U) *Binomial distributions, WUAFOSR2304A5, PE61102F

DESCRIPTORS: (U) *VALUE, *THEORY, SEQUENCES, STATIONARY, ORDER STATISTICS, RANDOM VARIABLES, CLUSTERING, MODIFICATION, CONVERGENCE, STOCHASTIC PROCESSES, MATHEMATICS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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SEARCH CONTROL NO. EVK15N

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AD-A159 131

12/1

NORTH CAROLINA STATE UNIV AT RALEIGH

SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND STATISTICS

(U) Fast Algorithms for Structural Optimization, Least Squares and Other Computations.

(U) Nonparametric Methods for Hazard Rate Estimation from Right-Censored Samples.

DESCRIPTIVE NOTE: Final rept. 15 Jul 84-14 Jul 85.

JUL 85 8P

DESCRIPTIVE NOTE: Technical rept..

AUG 85 21P

PERSONAL AUTHORS: Plemmons, R. J. ;

PERSONAL AUTHORS: McNichols, D. T. ; Padgett, W. J. ;

CONTRACT NO. AFOSR-83-0255

REPORT NO. TR-106

PROJECT NO. 2304

TASK NO. A3

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

MONITOR: AFOSR
TR-85-0714

PROJECT NO. 2304

TASK NO. A5

UNCLASSIFIED REPORT

ABSTRACT: (U) Fast algorithms for solving large-scale structural optimization and least squares problems are being investigated. An especially significant aspect of this work is the development and testing of parallel algorithms for alternatives to the often ill-conditioned stiffness equations approach in structural analysis on machines such as the Cray X-MP, the Denelcor HEP and the Intel Hypercube. The principal thrusts in this project on least squares methods have been in developing techniques for the solution of superlarge problems in a stable way, i.e., employing orthogonal factorization techniques, on multiprocessors. These computations involve various levels of parallelism, including domain decomposition as well as pipelining type schemes for orthogonal factorization. Additional keywords: linear algebra; parallel processing. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, *ALGORITHMS, PROBLEM SOLVING, EQUATIONS, LEAST SQUARES METHOD, MULTIPROCESSORS, ORTHOGONALITY, PARALLEL PROCESSING, STABILITY, OPTIMIZATION, STRUCTURES, LINEAR ALGEBRA, STRUCTURES, MACHINES, STRUCTURAL ANALYSIS

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A3

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UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Virginia Polytechnic Inst. and State Univ., Blacksburg, Dept. of Statistics.

ABSTRACT: (U) Nonparametric estimation of the hazard rate or failure rate is a frequent topic of investigation in the statistical literature because of its practical importance. Until quite recently, hazard rate estimation had been based on complete samples of independent identically distributed lifetimes. However, observations may be censored or truncated in many life testing situations. This occurs often in medical trials when the patients may enter treatment at different times and then either die from the disease under investigation or leave the study before its conclusion. A similar situation may occur in industrial life testing when items are removed from the test at random times for various reasons. It is of interest to be able to estimate nonparametrically the unknown hazard rate of the lifetime random variable from this type of data without ignoring or discarding the right-censored information. The purpose of this paper is to discuss nonparametric estimation of the hazard rate function for right-censored samples. The various types of

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estimators that have been proposed in the literature will be indicated and briefly discussed in Section 3. These include maximum likelihood estimators, kernel type estimators, Bayesian estimators, and histogram estimators. Due to their computational simplicity and other properties, the kernel-type hazard rate estimators will be emphasized. Results of Tanner (1983) and Tanner and Wong (1983, 1984) will be presented in Section 4 while the estimator considered by McNichols and Padgett (1981) will be discussed in Section 5.

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH KJELLER

(U) Development and Evaluation of a Regional Seismic Array in Norway.

DESCRIPTIVE NOTE: Quarterly technical rept. 1 Jan-31 Mar 85,

APR 85 38P

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, STATISTICAL SAMPLES, BAYES THEOREM, MAXIMUM LIKELIHOOD ESTIMATION, KERNEL FUNCTIONS, HISTOGRAMS, COMPUTATIONS, DISTRIBUTION, LIFE SPAN(BIOLOGY), HAZARDS, RATES, FUNCTIONS, FAILURE, INDUSTRIES, LIFE TESTS

PERSONAL AUTHORS: Mykkelveit, S. ;

CONTRACT NO. F49620-85-C-0016, ARPA Order-4950

PROJECT NO. 2309

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5

TASK NO. A1

MONITOR: AFOSR
TR-85-0717

UNCLASSIFIED REPORT

ABSTRACT: (U) Field installations have been operating very reliably during the reporting period. Sources of rather minor errors in the data were traced in close cooperation with Sandia, and appropriate actions were taken to modify the field system to eliminate these errors. Computer equipment for acquisition and processing of the MORESS data has been purchased and installed. All data received at Kjeller are now subjected to online processing for detection and location of seismic events. The RONAP program package, developed at NORSAR during the last couple of years, has been adapted for use on the new data. An advanced status monitoring system has been developed. This system generates statistics on all essential aspects of operations of the new array and suitable units for display of essential parameters have been acquired and installed. (Author)

DESCRIPTORS: (U) *SEISMIC ARRAYS, *SEISMOLOGICAL STATIONS, PERFORMANCE(ENGINEERING), SEISMIC DATA, DATA PROCESSING, ACQUISITION, COMPUTERS, INSTALLATION, ON LINE SYSTEMS, PROCESSING, SEISMOLOGY, COOPERATION, DETECTION, ARRAYS, REGIONS

IDENTIFIERS: (U) *NORSAR(Norwegian Seismic Array), RONAP

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computer program, Seismic events, WJAFOSR2308A1, PEG1102F

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) A Lisp Machine Facility for Expert Systems Research.

DESCRIPTIVE NOTE: Final rept. 1 Aug 83-31 Jul 84.

AUG 84 73P

PERSONAL AUTHORS: Chandrasekaran, B. ;

CONTRACT NO. AFOSR-83-0300

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-85-0636

UNCLASSIFIED REPORT

ABSTRACT: (U) During the year, progress was made in a number of directions: 1. A better understanding of different types of problem solving that underlie expert reasoning was obtained. 2. Advances in representing design knowledge as plans in design specialists were made. 3. CSRL, the language for diagnostic expert system building that was designed in our Laboratory, was applied to the implementation of a diagnostic system for the fuel system of an automobile and directions for new constructs for the language were obtained. 4. A representation for functional understanding of how a device works was obtained, and methods of automatically generating diagnostic expert systems from this representation of a device were also obtained. 5. An analysis of how techniques and tasks can be matched in expert design was undertaken. (Author)

DESCRIPTORS: (U) *COMPUTER AIDED DIAGNOSIS, *COMPUTER PROGRAMS, DIAGNOSIS(GENERAL), REASONING, FUEL SYSTEMS, PROBLEM SOLVING, SYSTEMS ANALYSIS, ORIENTATION(DIRECTION), VEHICLES

IDENTIFIERS: (U) Lisp programming language, *Expert systems, Automobiles, WJAFOSR2917A5, PEG1102F, LPN-OSURF-763725/715560

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CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL
ENGINEERING AND COMPUTER SCIENCES

(U) Lucky-Electron Model of Channel Hot-Electron Injection
in MOSFET's.

(U) Research on Materials and Components for Opto-
Electronic Signal Processing.

SEP 84 11P

PERSONAL AUTHORS: Tam, S. ; Ko, P. K. ; Hu, C. ;

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-30 Sep 84.

CONTRACT NO. F49620-79-C-0178, N00039-81-K-0251

OCT 84 53P

PROJECT NO. 2305

PERSONAL AUTHORS: Chang, W. S. C. ; Delavaux, J. M. ;
Forouhar, S. ; Sun, C. C. ; Van Eck, T. ;

TASK NO. A9

CONTRACT NO. AFOSR-80-0037

MONITOR: AFOSR
TR-85-0657

PROJECT NO. 2305

TASK NO. B1

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-85-0659

Availability: Pub. in IEEE Transactions on Electron
Devices, VED-31 n9 p1116-1125 Sep 84 (No copies furnished
by DTIC/NTIS).

UNCLASSIFIED REPORT

ABSTRACT: (U) The lucky-electron concept is successfully
applied to the modeling of channel hot-electron injection
in n-channel MOSFET's although the result can be
interpreted in terms of electron temperature as well.
This results in a relatively simple expression that can
quantitatively predict channel hot-electron injection
current in MOSFET's. The model is compared with
measurements on a series of n-channel MOSFET's and good
agreement is achieved. In the process, new values for
many physical parameters such as hot-electron scattering
mean-free path, impact ionization energy are determined.
Of perhaps even greater practical significance is the
quantitative correlation between the gate current and the
substrate current that this model suggests. (Author)

DESCRIPTORS: (U) *FIELD EFFECT TRANSISTORS, *METAL OXIDE
SEMICONDUCTORS, *INTEGRATED CIRCUITS, ELECTRONS,
ELECTROMAGNETIC SCATTERING, IONIZATION, GATES(CIRCUITS),
SUBSTRATES, ENERGY, N TYPE SEMICONDUCTORS, INJECTION,
REPRINTS

IDENTIFIERS: (U) Lucky electrons, Hot electrons,
CHEI(Channel Hot Electron Injection), WUAFOSR2305A9,
PE61102F

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UNCLASSIFIED

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ABSTRACT: (U) Design of chirped grating lenses on
optical waveguides for opto-electronic signal processing
is presented in this report. Fundamental limitations of
the performance of chirped grating lenses due to material
properties, fabrication tolerance and design parameters
are discussed. In addition electro-absorption and electro-
refraction properties in GaAs and Inp semiconductors are
presented. Cross modulation of optical radiations at two
different wavelengths has been observed in GaAs. It has
the potential of exhibiting optical AND logic. Keywords
include: Chirped grating; waveguide lens; opto-electronic
signal processing; and electrorefraction III-V compound
opto-electronic devices.

DESCRIPTORS: (U) *ELECTROOPTICS, *SIGNAL PROCESSING,
*LENSES, CHIRP RADAR, GRATINGS(SPECTRA), CROSS MODULATION,
GROUP III COMPOUNDS, GROUP V COMPOUNDS, OPTICAL
WAVEGUIDES, MATERIALS, WAVEGUIDES, FABRICATION, TOLERANCE,
LOGIC, OPTICAL PROPERTIES, SEMICONDUCTORS

IDENTIFIERS: (U) WUAFOSR2305B1, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

REACTION TIME

(U) The Event Related Brain Potential as an Index of Information Processing, Cognitive Activity, and Skill Acquisition: A Program of Basic Research.

IDENTIFIERS: (U) ERP(Event Related Potentials P300),
MUAFOSR2313A4, PE61102F

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-31 Aug 84,

FEB 85 774P

PERSONAL AUTHORS: Donchin, E.; Wickens, C.; Coles, M. G. H.;

REPORT NO. CPL-85-1

CONTRACT NO. F49620-83-C-0144

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0662

UNCLASSIFIED REPORT

ABSTRACT: (U) We review a program of research designed to understand the event-related brain potential (ERP) so that it can be used as a tool in the study of cognitive function and in the assessment of man-machine systems. We have conducted a series of studies on the functional significance of ERPs and have demonstrated that the P300 component is related to memory processes. We have used measures of the same component to evaluate workload, to time mental processes, to study the reciprocity of processing resources, and to extend theories of human information processing. We have also made technical advances in the analysis of the distribution of electrical potentials across the scalp. Keywords: Event-related brain potential (ERP); P300; Memory; Mental chronometry; Information processing; Workload; Automatic versus controlled processing; Resource reciprocity; Dual tasks vector filters.

DESCRIPTORS: (U) *COGNITION, *INFORMATION PROCESSING, MAN MACHINE SYSTEMS, CONTROL, INDEXES, MEMORY(PSYCHOLOGY), HEAD(ANATOMY), MENTAL ABILITY, BRAIN, HUMANS, INFORMATION PROCESSING, ACQUISITION, FILTERS, WORKLOAD, INFORMATION ELECTROENCEPHALOGRAPHY, PSYCHOPHYSIOLOGY, AUTOMATIC.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 108 12/1

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Unified Method for Delay Analysis of Random Multiple Access Algorithms.

DESCRIPTIVE NOTE: Interim rept.,

AUG 85 63P

PERSONAL AUTHORS: Georgiadis, L.; Merakos, L.; Papantoni-Kazakos, P.;

REPORT NO. UCT/DEECS/TR-85-8

CONTRACT NO. AFOSR-83-0229

MONITOR: AFOSR TR-85-0712

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper presents a unified method for the delay analysis of a large class of random multiple access algorithms. This method is based on a powerful theorem referring to regenerative processes, in conjunction with results from the theory of infinite dimensionality linear systems. The method is applied to analyze and compute the per packet expected delays induced by three algorithms, in the presence of the Poisson user model. The considered algorithms are: The controlled ALOHA algorithm, the 0.487 algorithm, and the n-ary stack algorithm. Additional keywords: Communications networks; Markovian models; Throughput; Delay. (Author).

DESCRIPTORS: (U) *ALGORITHMS, *MULTIPLE ACCESS, *RANDOM ACCESS COMPUTER STORAGE, COMPUTATIONS, MATHEMATICAL MODELS, THROUGHPUT, DELAY, LINEAR SYSTEMS, MODELS, POISSON DENSITY FUNCTIONS, USER NEEDS, COMMUNICATIONS NETWORKS, MARKOV PROCESSES

IDENTIFIERS: (U) MUAFOFSR2304A5, PE61102F

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CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

(U) Computation of Photoelectron Counting Distributions by Numerical Contour Integration.

MAY 85 10P

PERSONAL AUTHORS: Helstrom, C. W.;

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0702

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Optical Society of America A, v2 n5 p674-682 May 85.

ABSTRACT: (U) Cumulative distributions of the number of photoelectrons ejected during a fixed interval can be computed by numerical contour integration in the complex plane when the light incident upon the detector is a combination of coherent light and incoherent background light with arbitrary spectral density. The integrand involves the probability-generating function of the distribution, and a method for computing it in terms of the solution of a certain integral equation is described. The method is related to those for the estimation of a stochastic process in the presence of white noise. An approximation valid for large values of the time-bandwidth product is also described. (Author)

DESCRIPTORS: (U) *COUNTING METHODS, *PHOTOELECTRONS, NUMERICAL INTEGRATION, COMPUTATIONS, CONTOURS, STOCHASTIC PROCESSES, WHITE NOISE, REPRINTS

IDENTIFIERS: (U) MUAFOFSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

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AD-A159 104 12/1 14/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Continuity of Certain Random Integral Mappings and the Uniform Integrability of Infinitely Divisible Measures.

(U) A Note on the Effect of Ignoring Small Measurement Errors in Precision Instrument Calibration.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Technical rept. Sep 84-Sep 85,

MAR 85 27P

JUN 85 17P

PERSONAL AUTHORS: Jurek, Z. J. ; Rosinski, J. ;

PERSONAL AUTHORS: Carroll, R. J. ; Spiegelman, C. H. ;

REPORT NO. TR-95

REPORT NO. MIMED SER-1580

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0684

TR-85-0701

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper it is shown that the class of probability measures $L(Q)$, which generalizes the classical Levy class L , is homeomorphic with the class ID sub log of all infinitely divisible probability measures having finite logarithmic moment. As an application of this result a set of generators of the entire class $L(Q)$ is described. As a necessary tool, the relationship between the uniform integrability of infinitely divisible measures and of their corresponding Levy measures is studied and this may be of independent interest. Additional keywords: Banach Space; Random integrals; Random variables; Operators(mathematics). (Author)

DESCRIPTORS: (U) *PROBABILITY, BANACH SPACE, GENERATORS, INTEGRALS, RANDOM VARIABLES, OPERATORS(MATHEMATICS)

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

ABSTRACT: (U) The authors' focus is the simple linear regression model with measurement errors in both variables. 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 Draper 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 & Peck (1983) for a similar statement. Scheffe (1983) 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 confidence intervals for x given Y . Keywords: Confidence intervals. (Author)

DESCRIPTORS: (U) *CALIBRATION, *ERRORS, LEAST SQUARES METHOD, MEASUREMENT, VARIATIONS, MODELS, LINEAR REGRESSION ANALYSIS, MATHEMATICAL MODELS, CONFIDENCE

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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LIMITS, INTERVALS, MEASUREMENT, INSTRUMENTATION, PRECISION, SLOPE, STATISTICAL PROCESSES, VARIABLES, STANDARD DEVIATION, DOCUMENTS, STATISTICS

IDENTIFIERS: (U) Confidence intervals, Precision instruments, Small errors, WUNRO42544, WUAFOSR2304A5, PE61102F

AD-A159 101 20/4 12/1

RENSELAEER POLYTECHNIC INST TROY NY DEPT OF MATERIALS ENGINEERING

(U) Early Transonic Ideas in the Light of Later Developments.

DESCRIPTIVE NOTE: Technical rept..

AUG 85 42P

PERSONAL AUTHORS: Cole, J. D. ;

CONTRACT NO. AFOSR-82-0155

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-85-0694

UNCLASSIFIED REPORT

ABSTRACT: (U) A survey is given of early ideas about transonic flow and their current interpretation.

DESCRIPTORS: (U) *TRANSONIC FLOW, AERODYNAMICS, THEORY, MATHEMATICAL MODELS, NUMERICAL METHODS AND PROCEDURES, SHOCK WAVES, DRAG, HISTORY, TRANSONIC WIND TUNNELS

IDENTIFIERS: (U) Supercritical flow, TSD(Transonic Small Disturbances), WUAFOSR2304A4, PE61102F

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WUAFOSR2304K3, PEG1102F

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
ELECTRICAL ENGINEERING

(U) Basic Research in Reliability for Real Systems.

DESCRIPTIVE NOTE: Annual technical rept. 15 Jul 84-14 Jul
85.

JUL 85 6P

PERSONAL AUTHORS: L.I.V. O. K. ;

CONTRACT NO. AFOSR-84-0269

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSK
TR-85-0711

UNCLASSIFIED REPORT

ABSTRACT: (U) The Event-Based Reliability Model (EBRM) was developed to model and analyze the reliability of a network in which component failures are statistically dependent. In EBRM, the events that could cause component failures were modeled explicitly. This approach had the great advantage that it required much less parameters than the traditional model employing conditional probabilities. The EBRM was also proved to be a completely general model which could be applied to any kind of failure dependencies. For reliability evaluations, many existing algorithms for computing network reliability could be used with minor modifications and no significant increase in computational complexity. An improved algorithm for the appropriate evaluation of network performance was also developed. For multi-state systems, ordered enumeration was used to approximate and bound system reliabilities and other performance measures, and an efficient algorithm was developed for this purpose. (Author)

DESCRIPTORS: (U) *RELIABILITY, *MATHEMATICAL MODELS,
*NETWORK ANALYSIS(MANAGEMENT), ALGORITHMS, COMPUTATIONS,
MULTIMODE, NETWORKS, PARTS, TEST AND EVALUATION

IDENTIFIERS: (U) Event based reliability model.

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AD-A159 099 6/16 AD-A159 089 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES
CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Stochastic Differential Equations for Neuronal Behavior.
(U) Evaluation of the Noncentral F-Distribution by Numerical Contour Integration.

DESCRIPTIVE NOTE: Technical rept..

JUN 85 44P

PERSONAL AUTHORS: Christensen, S. K. ; Kallianpur, G. ;

REPORT NO. TR-103

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0708

UNCLASSIFIED REPORT

ABSTRACT: (U) This article extends the recent work of Kallianpur and Wolpert modeling the behavior of neurons by means of stochastic partial differential equations on the dual of a nuclear space. The extensions will cover nuclear spaces of a more general structure and will apply to models described in terms of more general differential operators. A second objective of this article is to present a theoretical framework which will include the model recently proposed and heuristically investigated by Wan and Tuckwell. The authors illustrate their approach and its application by giving a rigorous treatment of the Wan and Tuckwell model. But first they briefly describe the neurophysiological context. Additional keywords: Voltage potential; Weak convergence; Mathematical models; Theorems. (Author)

DESCRIPTORS: (U) *NERVE CELLS, *DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, BEHAVIOR, MATHEMATICAL MODELS, VOLTAGE, OPERATORS(MATHEMATICS), WEAK CONVERGENCE

IDENTIFIERS: (U) PE61102F

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JUL 85 11P

PERSONAL AUTHORS: Helstrom, C. W. ; Ritcey, J. A. ;

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0689

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. Sci. Stat. Comput..
V6 n3 p505-514 Jul 85.

ABSTRACT: (U) The noncentral F-distribution, which yields the power function of tests of linear hypotheses as in the analysis of variance and of covariance, is computed by numerical integration of a contour integral in the complex plane. Determining the percentage points of this distribution is facilitated by approximating the integral by Laplace's method during the initial stages of a search by the secant method. (Author)

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, *NUMERICAL INTEGRATION, COMPUTATIONS, LINEARITY, HYPOTHESES, CONTOURS, APPROXIMATION(MATHEMATICS), LAPLACE TRANSFORMATION, REPRINTS

IDENTIFIERS: (U) *Noncentral F distribution, PE61102F, MUAFOSR2304A5

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UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

RESEARCH FACILITIES

(U) Coupled High Power Waveguide Laser Research.

IDENTIFIERS: (U) PE61102F, WJAFOSR2301A1

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

JUL 85 64P

PERSONAL AUTHORS: Newman, L. A.; Cantor, A. J.; Hart, R. A.;
Kennedy, J. T.; DeMaria, A. J.;

REPORT NO. UTRC/R85-926869

CONTRACT NO. F49620-84-C-0082

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0734

UNCLASSIFIED REPORT

ABSTRACT: (U) The United Technologies Research Center (UTRC) conducted a research program to explore a unique ridged waveguide technique to phase-lock an array of coupled CO₂ waveguide lasers. The motivation for this investigation was scale the output power capability of CO₂ waveguide lasers by one to two orders of magnitude greater than the present state-of-the-art (i.e., scale to power levels of 100 W to 1kW) while maintaining single frequency operation. A one year program was conducted to test the feasibility of the ridged waveguide coupling technique. The feasibility study clearly produced positive results. In particular, stable phase-locked operation of two and three-channel arrays was demonstrated at the 50 W level. Phase-locking was maintained in a laboratory environment for many hours without adjustments other than length tuning of the laser. In addition, a first-order theory was developed to strengthen the understanding of the coupled waveguide laser array. (Author)

DESCRIPTORS: (U) *COUPLING(INTERACTION). *WAVEGUIDES, *LASERS. *PHASE LOCKED SYSTEMS, ENVIRONMENTS, LABORATORIES. LENGTH, TUNING, OUTPUT, POWER, OPERATION, STABILITY. THEORY, MOTIVATION, POWER LEVELS, FREQUENCY,

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AD-A159 078 12/1

AD-A159 075 5/10 8/16

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

PACIFIC UNIV FOREST GROVE OR COLL OF OPTOMETRY

(U) Strong Representation of Weak Convergence.

(U) Theoretical Reliability of Visual Evoked Response-Based Acuity Determinations.

DESCRIPTIVE NOTE: Technical rept..

JUL 85 40P

FEB 85 6P

PERSONAL AUTHORS: Bai, Z. D.; Liang, W. Q.;

PERSONAL AUTHORS: Fagan, J. E., Jr.; Yolton, R. L.;

REPORT NO. TR-85-29

CONTRACT NO. AFOSR-82-0160

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2313

PROJECT NO. 2304

TASK NO. D9

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0683

TR-85-0595

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well known that there is a big difference between the concepts of weak and strong convergence of random variables. In the area of limiting theory, it is of interest to study the difference as well as the link between the two concepts of convergence. Additional keywords: Skorokhod's theorem; Finite dimension case; Eigenvalues; Random matrices.

DESCRIPTORS: (U) *RANDOM VARIABLES, *WEAK CONVERGENCE, CONVERGENCE, EIGENVALUES, MATRICES(MATHEMATICS)

IDENTIFIERS: (U) Skorokhods' theorem, PE61102F, WUAFOSR2304A5

SUPPLEMENTARY NOTE: Pub. in American Jnl. of Optometry & Physiological Optics, v62 n2 p95-99 Feb 85.

ABSTRACT: (U) The process of determining acuities from visual evoked responses (VER's) was computer modeled. Based on amplitude variability data from earlier studies, the reliability and validity of the acuity determinations for normal subjects were assessed. For subjects who had poor quality VER data (low signal-to-noise (S/N ratios), considerable variability and an artifactual shift toward elevated (better) acuity determinations were found. Key words: visual evoked response (VER), visual evoked potential, acuity, noise, reliability, steady-state.

DESCRIPTORS: (U) *VISUAL ACUITY, AMPLITUDE, LOW RATE, RELIABILITY, SIGNAL TO NOISE RATIO, COMPUTERIZED SIMULATION, MODELS, RESPONSE(BIOLOGY), REPRINTS

IDENTIFIERS: (U) *Visual evoked response, PE61102F, WUAFOSR2313D9

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 072 6/1 6/5

AD-A159 072 CONTINUED

CALIFORNIA UNIV SAN FRANCISCO

(U) Evidence for the Macromolecular Basis of Regulation of Heart Hypertrophy.
IDENTIFIERS: (U) Heart hypertrophy, Poly-ADP-ribose, Polymerase, Triiodothyronine, PE61102F, WUAFOSR2312AF

84 7P

PERSONAL AUTHORS: Jackowski, G.; Kun, E.;

CONTRACT NO. F49620-81-C-0007

PROJECT NO. 2312

TASK NO. AF

MONITOR: AFOSR
TR-85-0593

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in European Heart Jnl. v5 supplement F p219-224 1984.

ABSTRACT: (U) In vivo treatment of rats with triiodothyronine (0.3 micrograms per g body wt for four consecutive days) increases both poly(ADP-ribose) polymerase activity and DNA synthesis in myocardial nuclei obtained from 18-21-days-old rats. The same T3-treatment in 30-33-days-old rats inhibits poly(ADP-ribose) polymerase activity and simultaneously increases RNA synthesis in myocardial nuclei. A correlation was observed between the degree of inhibition of poly(ADP-ribose) polymerase and ventricular enlargement in triiodothyronine treated animals. RNA synthesis in isolated myocardial nuclei was inhibited by the in vitro poly ADP-ribosylated proteins were isolated from myocardial nuclei by the SDS-phenol extraction. More than 90% of the protein-poly ADP-ribose adducts partitioned into the aqueous phase behaving as if they were nucleic acids. Treatment with triiodothyronine significantly diminished poly ADP-ribosylation of three specific groups of poly ADP-ribosylated non-histone chromatin proteins corresponding to 130 kDa, 90-80 kDa and 80-65 kDa.

DESCRIPTORS: (U) *HEART, *CARDIOVASCULAR DISEASES, *ADENOSINE, *MACROMOLECULES, *RIBOSE, CONTROL, THERAPY, IN VIVO ANALYSIS, RATS, POLYMERS, REPRINTS

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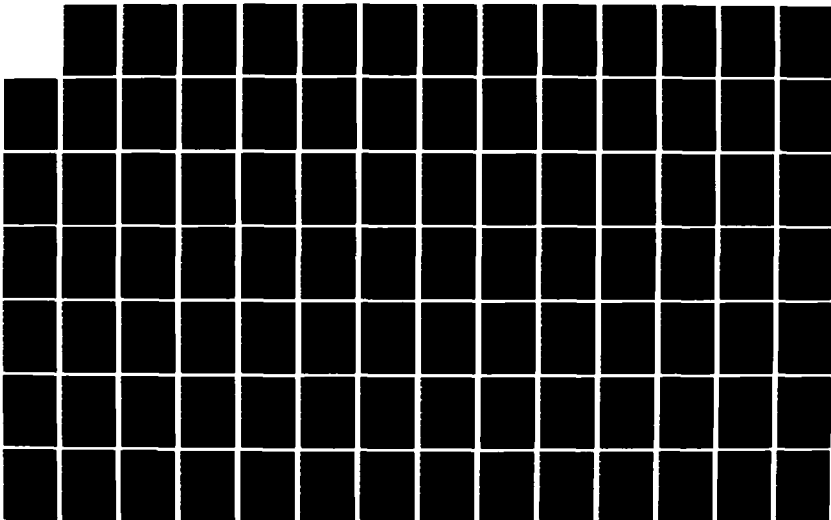
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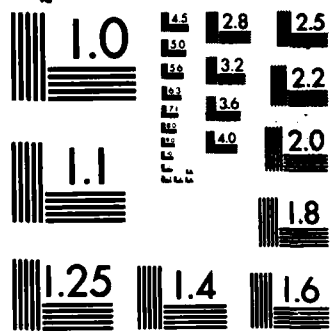
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NATIONAL BUREAU OF STANDARDS-1963-A

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 067 12/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Control and Identification of Time Varying Systems.
DESCRIPTIVE NOTE: Annual technical rept. 30 Jun 84-29 Jun 85.

JUL 85 9P

PERSONAL AUTHORS: Pearson, A. E. ;

CONTRACT NO. AFDSR-82-0230

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0690

UNCLASSIFIED REPORT

ABSTRACT: (U) Research is summarized for a projected integral equation error technique used in the parameter identification of differential-delay equation models, including the time delay estimation problem for received signals. Current research on a fresh look at the Shinbrot method of moment functionals is described relating to the modeling and identification of linear, bilinear and polynomial input-output differential systems. Current research is also described for the feedback stabilization of state delayed control systems using a reducing transformation technique. (Author)

DESCRIPTORS: (U) *ERROR ANALYSIS, *MATHEMATICAL MODELS, DELAY, ESTIMATES, FEEDBACK, IDENTIFICATION, PARAMETERS, STABILIZATION, TIME, TIME INTERVALS, INTEGRAL EQUATIONS, DIFFERENTIAL EQUATIONS, TRANSFORMATIONS(MATHEMATICS)

IDENTIFIERS: (U) *Time varying systems, WUAFOSR2304A1, PEB1102F

AD-A159 067

UNCLASSIFIED

AD-A159 065 6/20

PURDUE UNIV LAFAYETTE IN

(U) Early Phase Interactions of Toluene with Membranes: A Structural and Functional Evaluation.

DESCRIPTIVE NOTE: Interim rept. 1 Jan-31 Dec 84,

MAR 84 15P

PERSONAL AUTHORS: Morre, D. J. ;

CONTRACT NO. F49820-84-C-0003

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-85-0653

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of the research proposed was to define the subcellular site(s) or target(s) of action of the aromatic hydrocarbon toluene. Confirmed target sites were then to be investigated in detail to elucidate possible mechanisms of toluene action in perturbing membrane structure that might be related to either an enhancement or loss in membrane functions. Under this problem, several test systems developed in our laboratory for toxicological evaluation of target sites of membrane active substances were employed. The basic approach was to subject each tissue to a graded series of toluene concentrations for varying periods of time after which the material was prepared for electron microscopy under conditions developed to yield accurate and reproducible evaluations. Comparisons were to identical tissues treated in a similar fashion in the absence of toluene. Gross and subtle morphological changes were noted indicative of an activity target using the following three test systems: Primary Rat Hepatocytes in Culture, Cultured BHK, KB and L Cells, Outer Cap Cells of the Maize Root Tip.

DESCRIPTORS: (U) *TOLUENES, *TOXICOLOGY, AROMATIC COMPOUNDS, CELLS(BIOLOGY), ELECTRON MICROSCOPY, FUNCTIONS, HYDROCARBONS, INTERACTIONS, LIVER, RATS, REPRODUCTIBILITY, TIME INTERVALS, MEMBRANES(BIOLOGY), TISSUES(BIOLOGY).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 065 CONTINUED

AD-A159 059 12/1

MORPHOLOGY(BIOLOGY), CELL STRUCTURE, DYSFUNCTION, SITES,
TEST AND EVALUATION, MEMBRANES, TARGETS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) WUAFOSR2312A5, PE81102F

(U) Inadmissibility of the Best Equivariant Estimators of
the Variance-Covariance Matrix and the Generalized
Variance under Entropy Loss.

DESCRIPTIVE NOTE: Technical rept.,

JUL 85 22P

PERSONAL AUTHORS: Sinha, B. K. ; Ghosh, M. ;

REPORT NO. TR-85-27

CONTRACT NO. F49620-85-C-0008, NSF-DMS82-18191

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0898

UNCLASSIFIED REPORT

ABSTRACT: (U) Based on a data matrix and an independent Wishart matrix estimators dominating the best equivariant estimators of sigma and /sigma/ are obtained under two types of entropy loss. For simultaneous estimation of the mean vector and the variance covariance matrix of a multinormal population, a suitable entropy loss is developed and testimators dominating the pair consisting of the sample mean vector and the best multiple of the sample Wishart matrix are derived. A technique of SINHA is heavily exploited. Keywords: MANOVA test; Roy's maximum root test; Wishart distribution.

DESCRIPTORS: (U) *WISHART MATRICES, *ESTIMATES, DATA BASES, ENTROPY; DISTRIBUTION, COVARIANCE, ANALYSIS OF VARIANCE, POPULATION(MATHEMATICS)

IDENTIFIERS: (U) Roys maximum root test, WUAFOSR2304A5, PE81102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 055 CONTINUED

VREULS RESEARCH CORP THOUSAND OAKS CA

(U) Performance Measurement Guidelines for Research.

DESCRIPTIVE NOTE: Final rept. 15 Mar 80-30 Sep 82.

JUN 85 201P

PERSONAL AUTHORS: Vreuls, D. ; Obermayer, R. W. ; Wooldridge, A. L. ; Kelly, M. J. ;

CONTRACT NO. F49620-80-C-0058

PROJECT NO. 2313

TASK NO. A2

MONITOR: AFOSR
TR-85-0642

*PERFORMANCE(HUMAN), COMPUTER PROGRAMS, DATA PROCESSING, FORTRAN, JOINT MILITARY ACTIVITIES, LOGIC, MULTIVARIATE ANALYSIS, REQUIREMENTS, SAMPLING, SEGMENTED, TRAINING DEVICES, VARIABLES, FLIGHT TRAINING, TRANSFORMATIONS

IDENTIFIERS: (U) PEG1102F, WJAFOSR2313A2

UNCLASSIFIED REPORT

ABSTRACT: (U) All three military services are developing automated human performance measurement systems for aviation training devices and research on human performance. The purpose of this study was to create a set of aircrew-system performance measurement guidelines for research based on a review of current practice, and the measurement experience and technical judgement of the investigators. A subjective analysis of common measurement requirements among flight tasks for all phases of military aviation was conducted. The selection of system state variables would be dictated by the individual research problem, but guidelines for sampling, measure segmentation, and selection of transforms to create measurement were developed for common flight tasks and measurement problems. Performance measurement issues in system design, training, and automated performance measurement system design were discussed. FORTRAN program listings for common transforms and specialized multivariate data analyses for selecting and constructing measurement from empirical data were appended. Use of the illustrated techniques was recommended, as was the need to update these techniques as measurement experience accrues. Keywords: Performance Measurement, Segmentation Logic, Transformations.

DESCRIPTORS: (U) *MEASUREMENT, *FLIGHT SIMULATORS,

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AD-A159 054 20/12 20/8

AD-A159 054 CONTINUED

GTE LABS INC WALTHAM MA

IDENTIFIERS: (U) PEB1102F, WJAFOSR2305B4

(U) High Speed, Low Power Non-Linear Optical Signal Processing in Semiconductors.

DESCRIPTIVE NOTE: Annual rept. 26 May 84-25 May 85,

JUN 85 11P

PERSONAL AUTHORS: Dagenais, M. ;

CONTRACT NO. F49620-84-C-0052

PROJECT NO. 2305

TASK NO. 84

MONITOR: AFOSR
TR-85-0735

UNCLASSIFIED REPORT

ABSTRACT: (U) In the first year, significant advances were made in realizing the goals of this proposal. The lowest single beam switching (<8 pj) and the fastest reported ON/OFF switching (<1 ns) bistable device with clearly resolved states was demonstrated using the nonlinearity associated with bound excitons in CdS. The role of thermal effects in transient measurements done on the nanosecond time scale near free excitons was investigated theoretically. Thermal effects on the millisecond and microsecond time scales were experimentally studied. In particular, self-pulsation of the transmitted beam and intra-cavity optical bistability due to optically induced changes in absorption and refraction were investigated. Large degenerate four-wave mixing signals were observed near free and bound excitons in CdS at cryogenic temperatures. Four-wave mixing measurements at higher temperatures are now in progress. (Author)

DESCRIPTORS: (U) *SWITCHING, *EXCITONS, *MICROSECOND TIME, *NONLINEAR SYSTEMS, ABSORPTION, CRYOGENICS, HIGH TEMPERATURE, HIGH VELOCITY, LOW TEMPERATURE, MEASUREMENT, SCALE, SWITCHING, THERMAL PROPERTIES, TRANSIENTS, EXCITONS, MICROSECOND TIME, NONLINEAR SYSTEMS, THERMAL PROPERTIES

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 053 12/1

AD-A159 048 6/15

CONNECTICUT UNIV STORRS

CALIFORNIA UNIV IRVINE DEPT OF PSYCHOBIOLOGY

(U) Stochastic Adaptive Control and Estimation Enhancement.

(U) Effects of Acetylcholinesterase Inhibition on Cholinergic Transmission in the Hippocampal Slice.

DESCRIPTIVE NOTE: Final rept. Feb 80-Apr 84.

DESCRIPTIVE NOTE: Interim rept. 1 Nov 82-30 Sep 84.

MAR 85 72P

PERSONAL AUTHORS: Bar-Shalom, Y. ;

FEB 85 20P

CONTRACT NO. AFOSR-80-0098

PERSONAL AUTHORS: Lynch, G. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-82-0118

TASK NO. A1

PROJECT NO. 2312

MONITOR: AFOSR
TR-85-0888

TASK NO. A3

MONITOR: AFOSR
TR-85-0841

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents the results of the investigations conducted over a period of four years on control algorithms designed for stochastic systems. The main feature of these algorithms is that these account for: 1) the current uncertainty in the system; and 2) the anticipated future uncertainty in the system, which is in general control-dependent. The first feature leads to the control to have the cautious property in order to minimize the effect of the current uncertainties of the system's performance. The second feature allows the control to affect in addition to the system's state also the system's uncertainty. Such a controller is called dual controller because, by taking advantage of its dual effect has the capability of reducing the future uncertainties. These uncertainties can pertain to the system's state or its unknown parameters. Both continuous-valued and discrete-valued uncertainties have been considered.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *STOCHASTIC CONTROL, ALGORITHMS, CONTROL, ESTIMATES, STOCHASTIC PROCESSES

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A1

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ABSTRACT: (U) This research program is concerned with the long-term consequences of prolonged elevation of acetylcholine on cholinergic and non-cholinergic transmission in hippocampal synapses and the mechanisms through which any such effects might be achieved. Progress has been made in three areas: (1) a cholinergically mediated physiological response has been identified in the in vitro hippocampal slice, (2) the response of the hippocampus to repeated applications of cholinergic agonists has been found to be relatively constant, particularly when compared to that elicited by activation of two types of receptors for adic amino acids, and (3) the stimulation of a potentially very potent second messenger system (turnover of phosphatidylinositol) by cholinergic agonists was discovered to be completely blocked by concurrent activation receptors for amino acid transmitters. These results point to the conclusions that the cholinergic receptor is not particularly labile and that its interaction with its second messenger target system is tightly regulated by noncholinergic inputs.

DESCRIPTORS: (U) *ACETYLCHOLINE, *ACETYLCHOLINESTERASE, *CHOLINESTERASE INHIBITORS, ACTIVATION, AMINO ACIDS, CHOLINERGIC NERVES, ELEVATION, HIPPOCAMPUS, IN VITRO ANALYSIS, INHIBITION, PHYSIOLOGICAL EFFECTS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A159 044 20/9

RESPONSE(BIOLOGY), SENSE ORGANS, STIMULATION(GENERAL),
SYNAPSE, NEUROCHEMICAL TRANSMISSION,
STIMULATION(PHYSIOLOGY), NERVE TRANSMISSION

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Theoretical Studies of Kinetic Mechanisms of Negative
Ion Formation in Plasmas.

IDENTIFIERS: (U) WUAFOSR2312A3, PE61102F

DESCRIPTIVE NOTE: Final rept. 1 Jun 83-1 Jun 85.

JUN 85 34P

PERSONAL AUTHORS: Michels,H. H. ;Hobbs,R. H. ;

REPORT NO. UTRC/R85-928533

CONTRACT NO. F49620-83-C-0094

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0737

UNCLASSIFIED REPORT

ABSTRACT: (U) This technical program constitutes a theoretical research investigation of the kinetic mechanisms of negative ion formation 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 was to identify the most important reactions leading to negative ion production or destruction and to estimate these reactions leading to negative ion production or destruction and to estimate these reaction 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. 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. Keywords: Lithium ions; Hydrogen

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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ions; Deuterium ions; Potential energy surfaces; Negative ions; Dissociative attachment; H(-) Li2 ion-molecule reactions.

DESCRIPTORS: (U) *HYDROGEN, *IONS, *ANIONS, *PLASMAS(PHYSICS), DEUTERIUM, IONS, PARAMETERS, FUNCTIONS, KINETICS, LITHIUM, IONIZATION, ATTACHMENT, DISSOCIATION, VAPOR PHASES, ION SOURCES, LIGHT RATES, REACTION TIME, SOURCES, POTENTIAL ENERGY, SURFACES, QUANTUM THEORY, RELIABILITY, THEORY, MODELS

IDENTIFIERS: (U) WJAFOSR2301A7, PE61102F

AD-A159 043 6/4 15/5 12/1

CARNEGIE-MELLON UNIV PITTSBURGH PA ROBOTICS INST

(U) Constraint-Based Scheduling in an Intelligent Logistics Support System: An Artificial Intelligence Approach.

DESCRIPTIVE NOTE: Annual rept. 15 Mar 84-14 Mar 85,

JUL 85 15P

PERSONAL AUTHORS: Fox, M. S. ; Smith, S. F. ;

CONTRACT NO. F49620-82-K-0017

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-85-0720

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the progress of research performed under AFOSR contract Number F49620-82-K-0017, titled Constraint-Based Scheduling in an Intelligent Logistics Support System: An Artificial Intelligence Approach. During the contract renewal period from March, 1984 to March, 1985, the continued development of a theory of hierarchical, opportunistic constraint-directed reasoning for job shop scheduling has been the focus of our research. Specifically, we have conducted work in the areas of opportunistic exploitation of constraints, and constraint-directed diagnosis. The former has led us to the use of multiple problem decompositions during schedule generation, while the latter has evolved toward development of a more broad based framework for reactive scheduling. An experimental software system call ISIS has continued its evolution and additional testing with simulated plant data has been performed. The design of a successor system called PHOENIX has been initiated. (Author)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *SCHEDULING, *LOGISTICS SUPPORT, APPROACH, COMPUTER PROGRAMS

IDENTIFIERS: (U) WJAFOSR2304A7, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A159 037 CONTINUED

OREGON UNIV EUGENE DEPT OF PHYSICS

Kronig fluctuations.

(U) Residual Limitations of Theoretical Atomic-Electron Binding Energies.

DESCRIPTORS: (U) *ATOMIC ENERGY LEVELS, ELECTRONS, QUANTUM ELECTRODYNAMICS, RELAXATION, RELATIVITY THEORY, CORRELATION, ATOMIC PROPERTIES, REPRINTS

FEB 85 9P

PERSONAL AUTHORS: Chen, M. H. ; Crasemann, B. ; Martensson, N. ; Johansson, B. ;

IDENTIFIERS: (U) Binding energy. WUAFOSR2031A4, PE61102F

CONTRACT NO. F49620-84-C-0039

PROJECT NO. 2031

TASK NO. A4

MONITOR: AFOSR
TR-85-0654

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v31 n2
p556-563 Feb 85.

ABSTRACT: (U) Relativistic calculations of atomic-electron binding energies have been refined by using the relativistic LS-average scheme to treat open outer shells by including self-energy corrections for shells up to 3p as well as 4s, and accounting for energy shifts caused by interaction with Coster-Kronig continua. The contributions of ground-state correlation were estimated from the pair energy calculated through nonrelativistic many-body theory. The need for a relativistic theory of calculations include relaxation, the effect of finite nuclear size, Breit interaction, and quantum-electrodynmic (QED) corrections. Results are compared with binding energies measured on free atoms and with solid-phase measurements on metals that have been corrected for solid-state shifts; these shifts were calculated under the assumption of complete screening with the core-ionized site treated as a neutralized metallic impurity atom in the original metallic host. Discrepancies between experimental energies and relativistic independent-particle calculations including relaxation, QED, and finite-nuclear-size corrections are traced to correlation corrections, uncertainties in the self-energy, and neglect of the effect of (super-)Coster-

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 035 12/1

AD-A159 034 20/5 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

IOWA UNIV IOWA CITY

(U) A Kalman Filter Solution of the Inverse Scattering Problem with a Rational Reflection Coefficient,

(U) Alkali Metal Diffuse Band Laser.

MAY 85 7P

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

PERSONAL AUTHORS: Levy, B. C. ;

JUL 85 12P

CONTRACT NO. AFOSR-82-0135, NSF-ECS83-12921

PERSONAL AUTHORS: Stwalley, W. C. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-84-0178

TASK NO. A1

PROJECT NO. 2301

MONITOR: AFOSR
TR-85-0721

TASK NO. A1

MONITOR: AFOSR
TR-85-0736

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters, v5 n6 p377-382 May 85.

ABSTRACT: (U) This paper presents a new inverse scattering method for reconstructing the reflectivity function of symmetric two-component wave equations, or the potential of a Schrodinger equation, when the reflection coefficient is rational. This method relies on the so-called Chandrasekhar equations which implement the Kalman filter associated to a stationary state-space model. These equations are derived by using first a general layer stripping principle to obtain some differential equations for reconstructing a general scattering medium, and by specializing these recursions to the case when the probing waves have a state-space model. (Author)

DESCRIPTORS: (U) *INVERSE SCATTERING, *KALMAN FILTERING, PROBLEM SOLVING, REFLECTIVITY, COEFFICIENTS, SCHRODINGER EQUATION, WAVE EQUATIONS, LINEAR DIFFERENTIAL EQUATIONS, REPRINTS

IDENTIFIERS: (U) Chandrasekhar equations, WUAFOSR2304A1, PE61102F

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ABSTRACT: (U) Progress is described on study of a new class of potential excimer lasers based on diffuse bands of the alkali metal vapors. In particular, it has been established that the violet diffuse bands of sodium vapor and the yellow diffuse bands of potassium vapor are each composed of overlapping singlet and triplet 'excimer' emission continua of the diatomic molecule. The violet gain and low absorption loss previously found with laser optical pumping of sodium vapor have been confirmed and extended to yellow gain and low absorption loss in potassium vapor. Prospects for laser oscillation in the near future appear to be very good. (Author)

DESCRIPTORS: (U) *VAPORS, *LASER PUMPING, *EXCIMERS, *DIATOMIC MOLECULES, *POTASSIUM, *SODIUM, ALKALI METALS, BANDS(STRIPS), DIFFUSION, OPTICAL PUMPING, DESORPTION, LOW LOSS, YELLOW(COLOR), MOLECULES, GAIN, LASERS, OSCILLATION, VAPORS

IDENTIFIERS: (U) WUAFOSR2301A1, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 033 5/10

AD-A159 031 20/8 20/10

BEHAVIORAL RESEARCH ASSOCIATES WEST LAFAYETTE IN

OREGON UNIV EUGENE DEPT OF PHYSICS

(U) Biocybernetic Analysis of a Hybrid Workload Model.

(U) Fluorescence Yields and X-Ray Production from Atomic Inner Shells.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-30 Mar 85 on Phase 1.

AUG 84 25P

MAY 85 40P

PERSONAL AUTHORS: Crasemann, B. ;

PERSONAL AUTHORS: Kantowitz, B. H. ;

CONTRACT NO. F49820-85-C-0040, ARPA Order-4087

REPORT NO. BRA-85-10

PROJECT NO. 2301

CONTRACT NO. F49820-84-C-0116

TASK NO. A4

PROJECT NO. 3005

MONITOR: AFOSR TR-85-0650

TASK NO. A1

MONITOR: AFOSR TR-85-0661

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Biocybernetic measures - heart rate inter-beat interval (IBI) and event-related brain potential (ERP) - were used to provide converging operations to refine a hybrid model of attention and workload. Two experiments using the psychological refractory period paradigm were conducted with stimulus-response uncertainty and inter-stimulus interval (ISI) as manipulations of workload. Reaction time was influenced by uncertainty and ISI; IBI standard deviation and spectral data were influenced by uncertainty; preliminary analysis of ERP showed N200 amplitude to be influenced by uncertainty and ISI. These results were related to a hybrid processing model formulated by Kantowitz and Knight (1978). Keywords: Workload, Biocybernetic, Psychological refractory period, Heart rate, Sinus arrhythmia, Event-related potential.

DESCRIPTORS: (U) *CYBERNETICS, HEART RATE, HYBRID SYSTEMS, REACTION TIME, STANDARD DEVIATION, ATTENTION, SPECTRA, WORKLOAD, MODELS, PROCESSING

IDENTIFIERS: (U) *Biocybernetics, WJAFOSR3005A1, PEG1102F

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SUPPLEMENTARY NOTE: Pub. in Proceedings: Workshop on High-Energy Ion-Atom Collisions (2nd), p198-221, 27-28 Aug 84.

ABSTRACT: (U) In this paper we briefly review the theory of photon emission in energetic atomic transition, with special emphasis on relativistic effects and gauge dependence. We review present-day ab initio calculations of the total widths of atomic hole states and point out some frustrating difficulties that remain unresolved. The consequent limitation on theoretical fluorescence yields of single-vacancy states are outlined, and some general principles regarding their fluorescence yields of multiply ionized systems are noted. (Author)

DESCRIPTORS: (U) *ATOMIC ENERGY LEVELS, *ELECTRON TRANSITIONS, *PHOTONS, *FLUORESCENCE, X RAYS, EMISSION, ELECTRONIC STATES, HOLES(ELECTRON DEFICIENCIES), IONIZATION, COLLISIONS

IDENTIFIERS: (U) Ion atom interactions

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 029 9/2

AD-A159 026 20/4

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

MATHEMATICAL SCIENCES RESEARCH INST BERKELEY CA

(U) Parallel Image Processing and Image Understanding.

(U) Turbulence and Dynamical Systems.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-1 Apr 85.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-31 Dec 84.

JUL 85 9P

DEC 84 21P

PERSONAL AUTHORS: Rosenfeld,A. ;

PERSONAL AUTHORS: Chorin,A. ;Feldman,J. ;Moore,C. G. ;

CONTRACT NO. F49620-83-C-0082

CONTRACT NO. AFOSR-83-0265

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A7

TASK NO. A4

MONITOR: AFOSR TR-85-0645

MONITOR: AFOSR TR-85-0646

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research conducted during the period May 1983 - April 1985. Abstracts of 20 reports are given in chronological order. This bibliography deals with the following topics: a) Parallel algorithms and architectures for processing images and data structures derived from images; b) Interprocessor communication for parallel processing; c) Knowledge-based image understanding; and, d) Image modeling. (Author)

ABSTRACT: (U) The emphasis in this program was on the bringing together, in connection with the overall effort on dynamical systems, researchers from physics, mathematics, engineering; working in the various aspects of liquid helium theory, crystal growth, etc. This report summarizes the results of a workshop and contains 8 abstracts on related topics.

DESCRIPTORS: (U) *IMAGE PROCESSING, *PARALLEL PROCESSING, ALGORITHMS, ARCHITECTURE, BIBLIOGRAPHIES, COMPUTER COMMUNICATIONS, DATA BASES, IMAGES, MODELS, ARTIFICIAL INTELLIGENCE

DESCRIPTORS: (U) *TURBULENCE, APPLIED MATHEMATICS, ENGINEERING, CRYSTAL GROWTH, LIQUID HELIUM, THEORY, DYNAMICS, PHYSICS

IDENTIFIERS: (U) Image understanding, Knowledge based systems, PE61102F, WUAFOSR2304A7

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4

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OREGON UNIV EUGENE DEPT OF PHYSICS

MISSOURI UNIV-ROLLA

(U) Threshold Excitation of Short-Lived Atomic Inner-Shell Hole States with Synchrotron Radiation.

(U) Approximate Tolerance Limits on Reliability for the Gamma Distribution.

MAR 85 5P

JUN 84 5P

PERSONAL AUTHORS: Armen, G. B. ; Aberg, T. ; Levin, J. C. ; Crasemann, B. ;

PERSONAL AUTHORS: Lee, J. B. ; Engelhardt, M. ; Shiue, W. K. ;

CONTRACT NO. F49620-84-C-0039

CONTRACT NO. AFOSR-84-0164

PROJECT NO. 2301

PROJECT NO. 2304

TASK NO. A4

TASK NO. A5

MONITOR: AFOSR TR-85-0649

MONITOR: AFOSR TR-85-0643

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v54 n11 p1142-1145, 18 Mar 85.

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Reliability, VR33 n2 p184-187 Jun 84.

ABSTRACT: (U) The Xe L subscript 3-M subscript 4 M subscript 5 (superscript 1G Subscript 4) Auger spectrum, photoexcited in the vicinity of the L subscript 3 edge, has been measured as a function of photon energy. The nd spectator-electron satellite lines show resonant behavior. The diagram line exhibits the largest (> or = 1 eV) post-collision interaction shift yet observed. For comparison with the data, the first fully quantum-mechanical calculation of the post-collision interaction in deep inner-shell Auger decay is performed, based on a resonant-scattering approach that involves a complete summation over intermediate L subscript 3 one-hole states.

DESCRIPTORS: (U) *ATOMIC ENERGY LEVELS, *ELECTRONIC STATES, *HOLES(ELECTRON DEFICIENCIES), AUGER ELECTRONS, SPECTRA, EXCITATION, THRESHOLD EFFECTS, PHOTOIONIZATION, COLLISIONS, REPRINTS

IDENTIFIERS: (U) WUAFOSR2301A4, PE61102F

DESCRIPTORS: (U) *STATISTICAL PROCESSES, *APPROXIMATION(MATHEMATICS), *CONFIDENCE LIMITS, RELIABILITY, MAXIMUM LIKELIHOOD ESTIMATION, MONTE CARLO METHOD, REPRINTS

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AD-A158 997 6/16 6/15

IDENTIFIERS: (U) *Gamma distributions, Tolerance limits,
PE81102F, WJAF0SR2304AS

SRI INTERNATIONAL MENLO PARK CA LIFE SCIENCES DIV

(U) Neurophysiological Bases of Event-Related Potentials.

DESCRIPTIVE NOTE: Annual rept. no. 3, 1 May 84-30 Apr 85.

JUN 85 64P

PERSONAL AUTHORS: Rebert, C. S. ;

CONTRACT NO. F49620-82-K-0016

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0575

UNCLASSIFIED REPORT

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

ABSTRACT: (U) In order to more fully understand the physiological and psychological significance of event-related potentials, cortical and subcortical recordings are being obtained from monkeys performing in operant-conditioning tasks. Five cynomolgus monkeys were successfully trained in the cued-reaction time task at SRI International and recordings were obtained in several experimental conditions--tone discrimination, variation of interstimulus interval (ISI) and stimulus proportionality, and administration of atropine. Under some conditions stimulus salience was enhanced, as evidenced by enlarged evoked potentials, when the ISI and stimulus proportionality were altered. The effects of the anticholinergic drug atropine could be attributed to its peripheral effects. Preliminary examination of dynamic intracerebral interactions in one monkey was carried out in collaboration with A. Gevins at the EEG Systems Laboratory, and studies of two monkeys were continued at Stanford in order to study the P300 wave. Five female stump-tailed macaque monkeys were purchased, trained, and implanted and are ready for tone-light pairing and recording.

DESCRIPTORS: (U) *NEUROPHYSIOLOGY, BIOELECTRICITY.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 996 12/1

MONKEYS, BRAIN, REACTION TIME, STIMULI, ATROPINE

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

IDENTIFIERS: (U) Brain slow potentials, LPN-SRI-LSU-4373, MUAFOSR2313A4, PE61102F

(U) Realization and Approximation of Stationary Stochastic Processes.

DESCRIPTIVE NOTE: Technical rept..

FEB 85 88P

PERSONAL AUTHORS: Avniel, Y. ;

REPORT NO. LIDS-TH-1440

CONTRACT NO. DAAG29-84-K-0005, AFOSR-82-0135

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0874

UNCLASSIFIED REPORT

ABSTRACT: (U) To a multivariate stationary stochastic process, the author associates a scattering matrix S , which measures the interaction between the past and future of the process. This matrix valued function can be viewed as the generalized phase function associated with the spectral density. It determines the density up to congruency only for a completely non-deterministic sequence. Using the theory of Adamjan-Arov-Krein on extensions of Hankel operators, this report establishes that the Hankel operator H sub S determines the Laurent operator L sub S as its unique norm preserving lifting. Employing the Nagy-Foias theory on unitary dilations, or its dual, Lax-Phillips scattering operator model, a realization theory for equivalent classes of stationary sequences with the same density is developed. The minimal equivalence class of Markovian representations is induced by the coprime factorization of the scattering matrix. This presents a unified approach to stochastic and deterministic realization theory, with S as the analog of the frequency response function. To obtain reduced order models, the author approximates the given sequence with a jointly stationary one of a lower dimensional state space, minimizing the distance between the two sequences.

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AD-A158 996

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 996 CONTINUED

AD-A158 992 12/1

(Author)

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *STATIONARY, MULTIVARIATE ANALYSIS, SCATTERING, OPERATORS(MATHEMATICS), FREQUENCY RESPONSE, APPROXIMATION(MATHEMATICS), COVARIANCE

(U) On the Matrix Convexity of the Moore-Penrose Inverse and Some Applications.

DESCRIPTIVE NOTE: Technical rept..

IDENTIFIERS: (U) Hankel operators, WJAFOSR2304A1, PE61102F

JUL 85 18P

PERSONAL AUTHORS: Kaffes, D. G. ; Rao, M. B. ; Mathew, T. ; Subramanyam, K. ;

REPORT NO. TR-85-28

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0697

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper gives necessary and sufficient conditions for the validity of an inequality. Keywords: Theorems; Random matrices.

DESCRIPTORS: (U) *INEQUALITIES, VALIDATION, MATRICES(MATHEMATICS), INVERSION

IDENTIFIERS: (U) Moore Penrose inverse, WJAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 991 8/4

HERNDON SCIENCE AND SOFTWARE INC SAN DIEGO CA

(U) Technological Applications of Earth Core Research.

DESCRIPTIVE NOTE: Final rept. 1 Jan 82-1 Jan 85.

MAY 85 37P

PERSONAL AUTHORS: Herndon, J. M. ;

REPORT NO. HSSI-82-0004

CONTRACT NO. F49620-82-C-0024

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-0728

UNCLASSIFIED REPORT

ABSTRACT: (U) The research undertaken under the present AFOSR contract is intended to address the question of what elements might be expected to form silicides in the core of the Earth and is aimed at determining and demonstrating the technological feasibility of new concepts originating from the research. Specifically, the research objectives are the following (1) Prepare a complete bibliography on silicide technology, including the physical and chemical properties; (2) Determine the effects of phosphorous and copper on nickel silicide. Conduct experiments to determine what elements form silicides; (3) Conduct experiments on Earth core type materials to provide new materials and processes. The schedule is given for the tasks that are the research objectives and the deliverables.

DESCRIPTORS: (U) *EARTH CORE, *SILICIDES, *CHEMICAL PROPERTIES, *GEOCHEMISTRY, BIBLIOGRAPHIES, CHEMICAL PROPERTIES, COPPER, MATERIALS, NICKEL, PHOSPHORUS, PHYSICAL PROPERTIES, RESEARCH MANAGEMENT

IDENTIFIERS: (U) WJAFOSR2308A1, PE61102F

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AD-A158 988 8/11

CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB

(U) A Body-Wave Analysis of the 1966 Gisborne, New Zealand, Earthquake.

MAR 85 14P

PERSONAL AUTHORS: Webb, T. H. ; Wesnousky, S. G. ; Heimberger, D. V. ;

CONTRACT NO. F49620-83-C-0025

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-0652

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tectonophysics, v113 p271-282 Mar 85.

ABSTRACT: (U) The M sub L = 6.2 Gisborne earthquake of March 4, 1966 occurred along the East Coast of the North Island. Modeling of P and S body waves shows that the focal mechanism of this event is consistent with northward thrusting of the Pacific Plate beneath the North Island (Phi = 249 deg, delta = 25 deg, and lambda = 131 deg). The focal depth is constrained to 18 km, significantly less than the values of 25-30 km computed from local network data. Estimates of the scalar moment, source duration and stress-drop for the event are 4 x 10 to the 24th power dyne-cm, 2-3 s, and 20-120 bar, respectively. Cross-correlation errors of synthetic to observed waveforms were computed for all possible P and T axis locations and slip vector orientations and contoured on a projection of the focal sphere. The error contour at which the synthetic waveforms distinctly diverged from the observed waveforms was established by eye. The procedure shows that the analysis of long-period body waves, at least in this case, provides much better constraint on focal mechanism orientation than does first motion data alone.

DESCRIPTORS: (U) *EARTHQUAKES, *SEISMIC WAVES, NEW ZEALAND, WAVE ANALYZERS, TECTONICS, PACIFIC OCEAN, PLATES.

AD-A158 988

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 986 CONTINUED

AD-A158 985 12/1

DEPTH, CROSS CORRELATION, REPRINTS

ILLINOIS UNIV AT CHICAGO CIRCLE

IDENTIFIERS: (U) Body waves(Seismic waves), Plate tectonics, Pacific Plate, WJAFOSR2309A1, PE61102F

(U) Families of A-Optimal Block Designs for Comparing Test Treatments with a Control.

85 10P

PERSONAL AUTHORS: Hedayat,A. S. ;Majumdar,D. ;

CONTRACT NO. AFOSR-80-0170

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0644

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Annals of Statistics, v13
n2 p757-767 1985.

ABSTRACT: (U) A-optimal designs for comparing each of v test treatments simultaneously with a control, in b blocks of size k each are considered. It is shown that several families of BIB designs in the test treatments augmented by t replications of a control in each block are A-optimal. In particular these designs with $t = 1$ are optimal whenever $(k-2)$ to the 2nd power $+ 1 < or = v < or = (k-1)$ to the 2nd power irrespective of the number of blocks. This includes BIB designs associated with finite projective and Euclidean geometries. (Author)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, *STATISTICAL TESTS, COMPARISON, THEOREMS, REPRINTS

IDENTIFIERS: (U) *Block designs, Test treatments, WJAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 984 3/2 20/9

AD-A158 984 CONTINUED

TUFTS UNIV MEDFORD MA DEPT OF PHYSICS

(U) The Sun and Nearby Stars: Microwave Observations at High Resolution,

APR 85 10P

IDENTIFIERS: (U) Nearby stars, Ad Leo, Corona) loops, VLA(Very large arrays), Plasma heating, Main sequence stars, Microwave bursts, Brightness temperature, Dwarf stars, M-type stars, Nonthermal emissions, PEB1102F, WUAFOSR2308A1

PERSONAL AUTHORS: Lang,K. R. ;Kundu,M. R. ;

CONTRACT NO. Ar-OSR-83-0019

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-0648

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v228 n4895 p9-15, 5
Apr 85.

ABSTRACT: (U) High-resolution microwave observations are providing new insights into the nature of active regions and eruptions on the sun and nearby stars. The strength, evolution, and structure of magnetic fields in coronal loops can be determined by multiple-wavelength observations with the Very Large Array. Flare models can be tested with Very Large Array snapshot maps, which have angular resolutions of better than 1 second or arc in time periods as short as 10 seconds. Magnetic changes that precede solar eruptions on time scales of tens of minutes involve primarily emerging coronal loops and the interactions of two or more loops. Magnetic reconnection at the interface of two closed loops may accelerate electrons and trigger the release of microwave energy in the coronal parts of the magnetic loops. Nearby main-sequence stars of late spectral type emit slowly varying microwave radiation and stellar microwave bursts that show striking similarities to those of the sun. (Author).

DESCRIPTORS: (U) *STARS, *SOLAR FLARES, *PLASMAS(PHYSICS) *SOLAR RADIO MAPS, SOLAR CORONA, MICROWAVE EQUIPMENT, MAGNETIC FIELDS, BURST TRANSMISSION, HIGH RESOLUTION, SUNSPOTS, SOLAR OBSERVATORIES, ANTENNA ARRAYS, CHROMOSPHERE, POLARIZATION, INTERFACES, TEMPERATURE, TRANSITIONS, LOOPS, REPRINTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 982 12/1

AD-A158 975 9/2

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) On the Angle for Stationary Random Fields.

(U) Database Theory.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

DESCRIPTIVE NOTE: Final rept. 15 Jun 80-1 Nov 84.

APR 85 23P

FEB 85 9P

PERSONAL AUTHORS: Miamee, A. G.; Niemi, H. ;

PERSONAL AUTHORS: Ulman, J. D. ;

REPORT NO. TR-92

CONTRACT NO. AFOSR-80-0212

PROJECT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

TASK NO. A2

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0677

TR-85-0673

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The angle between past and future for stationary random fields on the lattice points of the plane is defined and it is shown that in contrast with other problems related to the past of random fields the positivity of the angle between past and future is independent of different pasts which have been considered. Most of the known facts concerning the angle for stochastic processes have been extended to the case of random fields. Additional keywords: random variables; Hilbert space; Operators(Mathematics). (Author)

DESCRIPTORS: (U) *HILBERT SPACE, OPERATORS(MATHEMATICS), STATIONARY, RANDOM VARIABLES, STOCHASTIC PROCESSES

IDENTIFIERS: (U) *Stationary random fields, PE61102F, WJAFOSR2304A5

ABSTRACT: (U) The research carried out under this grant from 1979-1984 centered around the design of universal relation database systems. Certain theoretical aspects of dependency theory received attention, especially the theory of acyclic hypergraphs and their corresponding join dependencies. We investigated the use of first-order logic as a way to describe the effect of updates on universal-relation databases, and views in general. A number of other topics concerning database systems also received attention, including concurrency control by locking, data coding for massive write-once memories, hash table designs, and logical interfaces for database systems. Keyword: Database theory.

DESCRIPTORS: (U) *DATA BASES, *THEORY, CODING, DATA PROCESSING, LOGIC, READ WRITE MEMORIES, INTERFACES

IDENTIFIERS: (U) Universal relation databases, PE61102F, WJAFOSR2304A2

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AD-A158 974 6/20 6/5 6/1 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A158 974 CONTINUED

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Chemical Carcinogen (Hydrazine et al.) Induced Carcinogenesis of Human Diploid Fibroblasts in vitro.
IDENTIFIERS: (U) PE61102F, WJAFOSR2312A5, LPN-OSURF-763408/715067

DESCRIPTIVE NOTE: Final rept. 1 Jul 80-30 Nov 84.

JUN 85 23P

PERSONAL AUTHORS: MILLO, G. ;

CONTRACT NO. AFOSR-83-0042

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-85-0629

UNCLASSIFIED REPORT

ABSTRACT: (U) There is data from in vivo animal systems that DMH and polynuclear hydrocarbons may pose a potential carcinogenic risk to man. They are metabolized to reactive intermediate metabolites that are localized in susceptible target sites. These sites may be away from the tissue that activates the proximate carcinogen. One such highly reactive intermediate obtained from DMH metabolism is methylazoxy methanol. This compound purportedly degrades to form methylidimine and formaldehyde. Methylidimine then forms a methyl radical after homolysis. This compound then is converted to a carbonium ion and the radical interacts with the purine bases in DNA. Methylazoxymethanol acetate, (MAMA) in the presence of colon, secum, and liver homogenates reduced NAD+ to NADH. The alcohol dehydrogenase-like enzymes are quite high in activity in the liver and may account for the organotypic response of MAM in animals. We continued biochemical studies to examine how these carcinogens were activated, entered the human cell and were transported to the nucleus. We also studied how these reactive carcinogenic intermediates interacted with different bases in the DNA.

DESCRIPTORS: (U) *HYDRAZINES, *HYDRAZINE DERIVATIVES, *CARCINOGENS, FIBROBLASTS, IN VITRO ANALYSIS, BIOCHEMISTRY, HUMANS, RISK, METABOLISM

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AD-A158 973 12/1

AD-A158 973 CONTINUED

PITTSBURGH UNIV PA DEPT OF ELECTRICAL ENGINEERING

FOURIER TRANSFORMATION, LINEARITY, MOTION, THEORY,
TRANSFORMATIONS(MATHEMATICS)

(U) Shift-Variant Multidimensional Systems.

IDENTIFIERS: (U) *Linear shift variant systems.
Multidimensional systems. PE61102F, WUAFOSR2304A6

DESCRIPTIVE NOTE: Final research rept. 1 Feb 83-31 Mar 85.

MAY 85 111P

PERSONAL AUTHORS: Boss, N. K. ;

CONTRACT NO. AFOSR-83-0038

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0724

UNCLASSIFIED REPORT

ABSTRACT: (U) To a great extent the techniques for analysis and restoration of images has been developed under the assumption that the system is linear shift-invariant (LSI). These techniques are successful in some cases because a system which is diffraction-limited or a system whose object plane undergoes uniform linear motion perpendicular to the system reference axis does indeed satisfy these assumptions. However, LSI systems are singled out for study mainly because of the widespread understanding of the Fourier Transform theory along with well-known fast algorithms for its implementation. In comparison with LSI systems, very little work has been done on linear shift-variant (LSV) systems. Most of the research on two dimensional LSV systems has been done on restoration techniques by means of coordinate transformations. This technique, decomposes the LSV system into a distortion of the input plane followed by a shift-invariant operation and terminated by a distortion of the output plane. The primary objective of this research is to provide not only a mathematical structure for the state-space modeling of discrete LSV systems but to apply this model to the problems of efficient analysis and deconvolution of multidimensional systems. Additional keywords: Mathematical models; images restoration.

DESCRIPTORS: (U) *MATHEMATICAL MODELS. *IMAGE RESTORATION, ALGORITHMS, AXES, COORDINATES, DISTORTION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 969 12/1

AD-A158 968 9/5 20/7 20/8

RENSELAER OBSERVATORY TROY N Y

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) Numerical Methods for Singularly Perturbed
Differential Equations with Applications.(U) Development of High Sensitivity X-Ray and Electron
Beam Resist Processes.DESCRIPTIVE NOTE: Annual scientific rept. 1 Jun 84-31 May
85.DESCRIPTIVE NOTE: Final technical rept. 15 Dec 79-29 Jan
85.

JUN 85 29P

MAY 85 27P

PERSONAL AUTHORS: Flaherty, J. E. ;

PERSONAL AUTHORS: Hess, D. W. ;

CONTRACT NO. AFOSR-80-0192

PROJECT NO. 2306

PROJECT NO. 2304

TASK NO. 82

TASK NO. A3

MONITOR: AFOSR
TR-85-0738MONITOR: AFOSR
TR-85-0719

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by this report the investigators continued their research on the development and application of adaptive numerical methods for singularly perturbed initial-boundary value problems for partial differential equations. They continued their analysis of the stability of mesh moving schemes for one-dimensional parabolic problems. They also developed at moving mesh scheme with local refinement for two-dimensional hyperbolic systems and are considering a similar scheme for parabolic problems. They are applying our methods to several interesting physical problems, such as, elastic-plastic solids, combustion, and a nonlinear Schrodinger equation which exhibits self-focusing. (Author)

ABSTRACT: (U) The lithographic performance of a polymer resist material is determined by several processes. First, uniform and controllable films of the resist must be reproducibly applied to the surface of substrates. Second, the radiation/polymer interaction is important since it affects the sensitivity of the resist. Third, the development or dissolution process is crucial because this step determines the ability to create useable patterns in the resist film. Finally, for Very Large Scale Integration (VLSI), dry etching processes are replacing liquid techniques; thus, the interaction of resists with glow discharges can often determine the utility of specific materials. Under AFOSR Grant 80-0078, various aspects of the above criteria were studied in order to gain fundamental understanding of these important process steps.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *NUMERICAL METHODS AND PROCEDURES, ADAPTATION, BOUNDARY VALUE PROBLEMS, COMBUSTION, DIFFERENTIAL EQUATIONS, ELASTIC PROPERTIES, HYPERBOLAS, ONE DIMENSIONAL, PARABOLAS, PERTURBATION THEORY, PERTURBATIONS, PHYSICAL PROPERTIES, PLASTIC PROPERTIES, SCHRÖDINGER EQUATION, SOLIDS, TWO DIMENSIONAL, NONLINEAR DIFFERENTIAL EQUATIONS, MESH

DESCRIPTORS: (U) *DRY MATERIALS, *INTEGRATION, *ELECTRON BEAMS, *X RAYS, ETCHING, GLOW DISCHARGES, LIQUIDS, SUBSTRATES, HIGH SENSITIVITY, INTERACTIONS, POLYMERS, RADIATION, MATERIALS

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A158 962 CONTINUED

DALHOUSIE UNIV HALIFAX (NOVA SCOTIA)

(U) Visual Sensitivities and Discriminations and Their Roles in Aviation.

DESCRIPTIVE NOTE: Interim technical rept. 1 Oct 83-30 Sep 84.

JUN 85 44P

PERSONAL AUTHORS: Regan, D. ;

CONTRACT NO. AFOSR-84-0030

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0639

UNCLASSIFIED REPORT

ABSTRACT: (U) This report present four studies. (1) An individual's ability to discriminate small differences in orientation about 5 and 0.5 deg respectively contrasts with the coarse size and orientation selectivity of neurons in the visual cortex of the brain. We report evidence that these fine discriminations are achieved by means of opponent processing: size discrimination is determined by antagonism between neurons that are coarsely selective for size, and orientation discrimination is mediated by neurons that are coarsely selective for orientation. Opponent processing implies that the neurons that determine detection are not the neurons that determine fine discrimination: we have experimentally verified that prediction. (2) We have measured motion discrimination in pilots and attempted to predict flying performance in simulators and telemetry-tracked aircraft. Correlations between laboratory tests and flying performance were encouraging, and were much stronger than for simple visual sensitivities such as motion on contrast sensitivity. (3) Some objects are invisible unless they move relative to the background, for example, a grassy hillock viewed against grass in nap of the earth helicopter flight. We have compared human visual sensitivity to such objects, with sensitivity to conventional objects defined by brightness difference.

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Spatial summation area, and temporal summation area are much larger for motion-defined objects than for brightness-defined objects. (4) We report evidence that the Vector Analysis technique of mathematics may be relevant to the physiological study of visual cues in guided self-motion. Keywords: Vision; flying performance; spatial form vision; motion perception; size discrimination; camouflage; orientation; discrimination.

DESCRIPTORS: (U) *DISCRIMINATION. *VISION. *VISUAL PERCEPTION. CAMOUFLAGE. HUMANS. MOTION. DETECTION. FLIGHT. HELICOPTERS. GRASSES. LABORATORY TESTS. CONTRAST. MOTION. SENSITIVITY. NERVE CELLS. ORIENTATION(DIRECTION). BACKGROUND. CUES(STIMULI). VECTOR ANALYSIS. VISUAL CORTEX. BRAIN. PILOTS

IDENTIFIERS: (U) PEG1102F, WJAFOSR2313A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 961 9/1 20/3

SPIRE CORP BEDFORD MA

(U) Improved Lifetime High Voltage Switch Electrode.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 May 85.

JUN 85 49P

PERSONAL AUTHORS: Halverson, W. ;

REPORT NO. SPIRE-FR-60053

CONTRACT NO. F49620-84-C-0120

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0733

UNCLASSIFIED REPORT

ABSTRACT: (U) In this Phase I Small Business Innovation Research (SBIR) program, preliminary tests of ion implantation to increase the lifetime of spark switch electrodes have indicated that a 185 kev carbon ion implant into a tungsten-copper composite has reduced electrode erosion by a factor of two to four. Apparently, the thin layer of tungsten carbide (WC) has better thermal properties than pure tungsten; the WC may have penetrated into the implanted body of the electrode by liquid and/or solid phase diffusion during erosion testing. These encouraging results should provide the basis for a Phase II SBIR program to investigate further the physical and chemical effects of ion implantation on spark gap electrodes and to optimize the technique for applications. Keywords include: Spark switches, electrodes, and ion implantation.

DESCRIPTORS: (U) *ELECTRODES, *SPARKS, *SPARK GAPS, *SWITCHES, ION IMPLANTATION, PURITY, DIFFUSION, THERMAL PROPERTIES, TUNGSTEN CARBIDES, EROSION, CHEMICALS, LAYERS, COMPOSITE MATERIALS

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A7

AD-A158 961

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AD-A158 950 20/8 7/4

PRINCETON UNIV NJ

(U) Scientific Report for Grant AFOSR-81-0104 for Periods Ending April 29, 1984 and March 29, 1985.

DESCRIPTIVE NOTE: Final rept. 1 Mar 81-28 Feb 85.

85 89P

PERSONAL AUTHORS: Happer, W. ; Wu, Z. ; Daniels, J. ; Kitano, M. ; Wende, P. ;

REPORT NO. AFCRL-84-414, AFOSR

CONTRACT NO. AFOSR-81-0104

MONITOR: AFOSR
TR-85-0729

UNCLASSIFIED REPORT

ABSTRACT: (U) The major thrust of the work supported by this grant during the past year has been studies of spin polarized noble gases. The aim of the work has been to understand the gas-phase spin transfer, which in heavy noble gases is dominated by interactions in van der Waals molecules. We have measured the three body formation rates and the collisional breakup rates of these molecules. We have also measured the strengths of the major spin interactions in the molecules. We have developed a simple theory of the spin rotation interaction in alkali-noble-gas molecules. This is the first theory which successfully accounts for the observed spin rotation constants in heavy noble gases. While much of the work is basic physics there are also close ties between this work and various practical problems. Atomic frequency standards and nmr gyroscopes, are examples of applied areas which are closely related to this work.

DESCRIPTORS: (U) *SPIN STATES, *POLARIZATION, *RARE GASES, MOLECULE MOLECULE INTERACTIONS, REACTION KINETICS, MOLECULAR ROTATION, ATOMIC PROPERTIES, FREQUENCY STANDARDS, COLLISIONS, RATES, GYROSCOPES, MOLECULES, INTERACTIONS, SPINNING(MOTION), CONSTANTS, ROTATION, PHYSICS, THEORY

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 949 20/8 7/4

STEVENS INST OF TECH HOBOKEN NJ DEPT OF PHYSICS AND
ENGINEERING PHYSICS

(U) Surface Production of Negative Hydrogen Ions.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 84-31 May 85.

JUL 85 81P

PERSONAL AUTHORS: Seidl, M. ;

CONTRACT NO. AFOSR-83-0230

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0726

UNCLASSIFIED REPORT

ABSTRACT: (U) Measurements of sputtering of adsorbed hydrogen by cesium ion bombardment have been completed. The temperature of the desorbed negative hydrogen ions is about 0.5 percent of the bombarding energy. An experiment for studying bombardment with cesium and hydrogen ions has been constructed. Formation of cesium coverage due to cesium bombardment of a molybdenum target has been studied. Cesium coverage is only weakly dependent on bombardment energy in the range from 100 to 500 eV. This is due to cesium ion implantation. Originator supplied keywords include: Ion Emission; Atom, Molecule and Ion Impact; Sputtering; Ion Sources.

DESCRIPTORS: (U) *HYDROGEN, *CESIUM, *ANIONS, *ION BOMBARDMENT, ION ION INTERACTIONS, SURFACE CHEMISTRY, ADSORPTION, ION IMPLANTATION, EMISSION, IONS, ION SOURCES, PRODUCTION, SURFACES, ATOMS, MOLYBDENUM, TARGETS, SPUTTERING

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7

AD-A158 949

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AD-A158 948 9/2

KMS FUSION INC ANN ARBOR MI

(U) Parallel Processing for Computational Continuum Dynamics.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-15 Mar 85.

MAY 85 44P

PERSONAL AUTHORS: McGrath, J. F. ;

CONTRACT NO. F49620-84-C-0111

MONITOR: AFOSR
TR-85-0670

UNCLASSIFIED REPORT

ABSTRACT: (U) The numerical solution of many problems in continuum dynamics is seriously limited by the computation rates attainable on computers with serial architecture. Parallel processing machines can achieve much higher rates. However, applying additional processors to a calculation is only part of the solution. This research was undertaken to develop parallel algorithms for explicit and implicit, Lagrangian and Eulerian finite difference schemes for computational continuum dynamics in one spatial dimension. First, the explicit conservation equations in the Lagrangian reference frame were readily reformulated for concurrent processing. Second, an implicit solution was derived for these equations. This is important because it yields unconditional stability. The parallelism is achieved via a block implicit numerical scheme. Third, a rezoning algorithm was employed with each Lagrangian integration stem to transform the mesh back to the Eulerian reference frame. The algorithmic development path lead to a parallelization of the processing in blocks of the finite difference zones. AWT each step of this research project, the derived numerical methods provided effective algorithms for exploiting the architectural advantages of the HEP H1000 (Heterogeneous Element Processor) computer. The computational timing data shows significant speed-up with the number of processes. (Author)

DESCRIPTORS: (U) *PARALLEL PROCESSING, ALGORITHMS, COMPUTATIONS, COMPUTERS, CONSERVATION, CONTINUUM MECHANICS, DYNAMICS, EQUATIONS, FINITE DIFFERENCE THEORY,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 948 CONTINUED

HETEROGENEITY, HIGH RATE, LAGRANGIAN FUNCTIONS, MACHINES,
NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES,
PATHS, PROCESSING EQUIPMENT, RATES, SOLUTIONS(GENERAL),
TIME, LAGRANGIAN FUNCTIONS, PROBLEM SOLVING

AD-A158 941 11/4
NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES
(U) Effective Behavior of Composite Materials.

IDENTIFIERS: (U) PE61102F

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-30 Nov 84.

APR 85 6P

PERSONAL AUTHORS: Papanicolaou, G. C. ;

REPORT NO. 5274192

CONTRACT NO. AFOSR-80-0228

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-85-0671

UNCLASSIFIED REPORT

ABSTRACT: (U) The main results of our work fall into three categories which we list in order of significance to our present and future work: (1) Focusing a singularity of the nonlinear Schrodinger equation. We have solved by a careful analytical-numerical method the basic question of what the local rate of blow-up is for solutions of the nonlinear Schrodinger equation with cubic nonlinearity in 2 space dimensions. This problem is a basic one that arises in many aspects of nonlinear wave propagation. (2) Selfdiffusion of interacting Brownian motions. Using methods of wave propagation in random media that we had developed earlier, we were able to study the effective behavior of a tagged Brownian particle in interaction with an infinite system of other such particles. (3) Bounds for effective properties of composites by analytic continuation. The analytic continuation method was known to work only for two component materials. In our work we extend it to multicomponent materials by using the theory of several complex variables.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, BROWNIAN MOTION, INTERACTIONS, NONLINEAR PROPAGATION ANALYSIS, WAVE PROPAGATION, LABELED SUBSTANCES, PARTICLES, COMPLEX VARIABLES, NONLINEAR SYSTEMS, SCHRODINGER EQUATION, MEDIA,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 941 CONTINUED

DIFFUSION, MATHEMATICAL MODELS

IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F

AD-A158 939 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Integrals and Processes with Independent Increments.

DESCRIPTIVE NOTE: Technical rept..

MAR 85 61P

PERSONAL AUTHORS: Hudson, W. N. ;

REPORT NO. TR-98

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0679

UNCLASSIFIED REPORT

ABSTRACT: (U) Stochastic integrals are defined using processes with independent increments as integrators. A simple and perhaps new method is given for obtaining approximating simple integrands. In the special case where the integrand is a stable motion of index p epsilon the integrand may have paths in L^p . Basic properties are established. Then the characteristic functions of integrals involving nonrandom integrands are computed and used to establish necessary and sufficient conditions for the independence of such integrals. Additional keywords: Stochastically continuous processes; and Brownian motion. (Author)

DESCRIPTORS: (U) *INTEGRALS, *STOCHASTIC PROCESSES, BROWNIAN MOTION, FUNCTIONS, MOTION, STABILITY, COMPUTATIONS, CONTINUITY

IDENTIFIERS: (U) Integrands, WJAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 934 12/1

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) Computation of Geometric Properties from the Media Axis Transform in $O(n \log n)$ Time.

DESCRIPTIVE NOTE: Technical rept.,

JUN 85 40P

PERSONAL AUTHORS: Wu, A. Y.; Bhaskar, S. K.; Rosenfeld, A.;

REPORT NO. CAR-TR-122, CS-TR-1497

CONTRACT NO. F49620-83-C-0082

PROJECT NO. 2304

TASK NO. K2

MONITOR: AFOSR TR-85-0616

UNCLASSIFIED REPORT

ABSTRACT: (U) The digital medial axis transfer (MAT) represents and image subset S as the union of maximal upright squares contained in S . Brute-force algorithms for computing geometric properties of S from its MAT require time $O(n^2)$, where n is the number of squares. Over the past few years, however, algorithms have been developed that compute properties for a union of upright rectangles in time $O(n \log n)$, which makes the use of the MAT much more attractive. This document reviews these algorithms and also presents efficient algorithms for computing union-of-rectangle representations of derived sets (union, intersection, complement) and for conversion between the union of rectangles and other representations of a subset. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *TRANSFORMATIONS(MATHEMATICS), AXES, DIGITAL SYSTEMS, COMPUTATIONS, GEOMETRY

IDENTIFIERS: (U) PE61102F, WJAFOSR2304K2

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AD-A158 932 6/20 6/8 21/4

VIRGINIA POLYTECHNIC INST BLACKSBURG

(U) A Novel Approach for Predicting Sublethal Effects of Toxicants to Aquatic Organisms.

DESCRIPTIVE NOTE: Annual scientific rept. no. 3, 1 Nov 81-31 Oct 84 (Final).

NOV 84 132P

PERSONAL AUTHORS: Cairns, J., Jr.; Buikema, A. L., Jr.; Doane, T. R.; Niederlehner, B. R.;

CONTRACT NO. AFOSR-82-0059

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-85-0485

UNCLASSIFIED REPORT

ABSTRACT: (U) This study compared the effects of water soluble fraction (WSF) of petroleum derived (P) JP-4, a common military and civilian jet fuel, and shale derived (SD) JP-4 on survival, growth, ventilatory rate, preference-avoidance behavior, and tissue of the bluegill sunfish (*Lepomis macrochirus*) to determine possible interrelationships and to determine which procedures might be most descriptive of sublethal stress. Comparative studies were also run using invertebrates and microbial communities. In acute tests, fish were generally more sensitive to jet fuel WSFs than invertebrates. This is consistent with previous observations on the relative toxicity of the major components, benzene and toluene. No major discrepancies occurred in the chronic sensitivities of fish and invertebrates. Fish ventilatory response appeared to be the quickest and most efficient of the sublethal tests used and provided a reasonable estimate of a chronic effect level. Microbial communities responded to low levels of jet fuel exposure, but toxicant related effects would probably be short-lived and of limited consequence in field exposures. Originator supplied keywords include: Toxicity, *Lepomis macrochirus*, Ventilatory rate.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 932 CONTINUED

AD-A158 931 21/4 21/2 20/6 20/4

Preference/Avoidance, Microbial Community, Aeolosoma headleyi, Daphnia pulex, Paratanytarsus parthenogenica.

YALE UNIV NEW HAVEN CONN

DESCRIPTORS: (U) *AQUATIC ORGANISMS, *JET ENGINE FUELS, *TOXICITY, BENZENE, DAPHNIA, INVERTEBRATES, LOW LEVEL, MICROORGANISMS, MILITARY APPLICATIONS, PETROLEUM PRODUCTS, PULEX, SENSITIVITY, SUBLETHAL DOSAGE, TOLUENES, TOXIC AGENTS, WATER, FISHES, COMMUNITIES

(U) Droplet Size and Evaporation Rate within a Two-Phase Flow by Morphology-Dependent Resonances in the Optical Spectra.

DESCRIPTIVE NOTE: Final rept. 15 Nov 81-31 Dec 84.

APR 85 28P

IDENTIFIERS: (U) PE61102F, WJAFOSR2312A5

PERSONAL AUTHORS: Chang, R. K. ; Chu, B. T. ; Long, M. B. ;

CONTRACT NO. F49620-82-K-0005

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-85-0566

UNCLASSIFIED REPORT

ABSTRACT: (U) In two-phase chemically reacting flows, the size, shape, and chemical content of fuel droplets affect combustion and their chemical by-products. A new in-situ and nonintrusive optical technique has been developed which provides highly accurate (one part in 10000 - 100,000) size and shape determination, as well as provide chemical speciation of the majority species forming the droplet. This all-optical technique uses the morphology-dependent resonances (MDRs) of spheres, spheroids, or any shape that enables an internal wave to travel around a great circle with appropriate phase shift. These MDRs in the fluorescence spectra of dye-doped droplets flowing in a linear stream have also provided information on: (1) evaporation rate of interacting droplets flowing in the ambient or heated environment; (2) condensation rate of interacting droplets flowing in a saturated vapor; and (3) surface tension and bulk viscosity of individual droplets which have been perturbed by a laser beam so as to cause slight shape distortions, e.g., from spheres to oblate or prolate spheroids. MDRs can provide wavelength selective high Q optical feedback for the internally generated fluorescent and Raman radiation. By using this high optical feedback, lasing from individual dye-tagged droplets of approx. 20 micron radius has been achieved. The potential of using

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bright laser droplets as markers in flow diagnostics is promising. Stimulated Raman scattering from individual droplets of approx. 20 micron radius has been achieved. Keywords: Liquid droplets; Lorenz/Mie formalism; Dynamic surface tension; Morphology-dependent resonances.

DESCRIPTORS: (U) *OPTICAL ANALYSIS. *COMBUSTION. *FUELS, *TWO PHASE FLOW, RESONANCE, ENVIRONMENTS, CONDENSATION, RATES, DROPS, SIZES(DIMENSIONS), INTERFACIAL TENSION, DIAGNOSIS(GENERAL), EVAPORATION, FLUORESCENCE, SPECTRA, FEEDBACK, OPTICAL PROPERTIES, INTERNAL WAVES, LASER BEAMS, LIQUIDS, VISIBLE SPECTRA, PHASE SHIFT, RADIATION, RAMAN SPECTRA, DETERMINATION, SHAPE, SPHERES, LIGHT SCATTERING, INTERACTIONS, INTERNAL, STREAMS, SATURATION, VAPORS, DISTORTION

IDENTIFIERS: (U) PEG1102F, WJAFOSR2308A3

AD-A158 928 5/10

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) When Words Collide: Orthographic and Phonological Interference during Word Processing.

83 27P

PERSONAL AUTHORS: Pollich, J. ; McCarthy, G. ; Wang, W. S. ; Donchin, E. ;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-85-0811

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biological Psychology, v16 p155-180 1983.

ABSTRACT: (U) The interaction between orthographic and phonological information was studied in two experiments by requiring subjects to match visually presented word pairs on the basis of their visual or rhyming similarity. Word pairs either rhymed and looked alike, rhymed but did not look alike, looked alike but did not rhyme, or did not rhyme and did not look alike. In Experiment 1 under rhyme matching, reaction time (RT) was markedly increased whenever there was a conflict between orthographic and phonological cues. Under visual matching, overall RT was shorter than rhyme matching, with visually similar rhyming and non-rhyming pairs producing equally rapid and short responses compared to the non-rhyming but visually different word pairs. Most subjects also responded slower to rhyming and visually different stimuli compared to word pairs that did not look alike or rhyme. Experiment 2 sought to specify the processing locus of these effects by recording event-related brain potentials (ERPs) under task conditions similar to the first experiment. The RT data essentially replicated the effects found in Experiment 1 for both matching tasks. The ERP data viewed in the context of these results suggested that the interaction of the orthographic and phonological codes begins at least at the stimulus comparison processing

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stage, but that conflict may also contribute to delays in response selection. The results are discussed in terms of several current models of word processing.

OLD DOMINION UNIV NORFOLK VA DEPT OF PSYCHOLOGY
(U) Assessment of Visuospatial Abilities Using Complex Cognitive Tasks.

DESCRIPTORS: (U) *WORDS(LANGUAGE), *INFORMATION PROCESSING, COMPARISON, MATCHING, PERCEPTION(PSYCHOLOGY), REACTION TIME, REPRINTS

DESCRIPTIVE NOTE: Final rept. 1 Jun 83-1 Apr 84,

IDENTIFIERS: (U) *Word processing(Psychology), PE61102F, WUAFOSR2313A4

NOV 84 36P

PERSONAL AUTHORS: Allen, G. L. ;

CONTRACT NO. AFOSR-83-0181

PROJECT NO. 2313

TASK NO. 09

MONITOR: AFOSR TR-85-0665

UNCLASSIFIED REPORT

ABSTRACT: (U) Two studies were conducted in separate areas concerned with visuospatial abilities. The first study was designed to examine the effects of type of instruction (verbal versus graphic) and sex of subject on the acquisition of procedural knowledge in a spatial task. The spatial task employed was a computerized maze learning task, with trials to criterion and errors to criterion serving as dependent variables. Results indicated that graphic instructions led to fewer errors and trials to criterion than did verbal instructions. However, the performance of males was not superior to that of females, and the hypothesized interaction involving type of instruction and sex of subject was not found. Correlations between psychometric measures of cognitive abilities and measures of maze learning were easily interpreted for learning under graphic instructions but were difficult to interpret for learning under verbal instructions. These findings suggested the need for additional research focusing on (a) replicating the current results, (b) delineating the factors underlying individuals' learning effectiveness under different types of instructions, and (c) examining individuals' awareness of the relationship between learning effectiveness and type of instruction in visuospatial tasks. The second study was designed to determine the relationship between performance on

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traditional paper-and-pencil tests of spatial abilities and performance on a task required macrospatial cognitive skills. Keywords include: Visuospatial abilities; cognitive abilities; maze learning; macrospatial cognition.

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH
(U) ARC Colorings, Partial Path Groups, and Parallel Graph Contractions.

DESCRIPTORS: (U) *LEARNING, *COGNITION, *MENTAL ABILITY, *SPACE PERCEPTION, SKILLS, INSTRUCTIONS, VISUAL PERCEPTION, PERFORMANCE(HUMAN), TEACHING METHODS, SPEECH, PSYCHOMETRICS, FEMALES, VARIABLES, GRAPHICS, SEX, PERCEPTION, ACQUISITION

DESCRIPTIVE NOTE: Technical rept..

JUL 85 40P

PERSONAL AUTHORS: Rosenfeld,A. ;

IDENTIFIERS: (U) Verbal instructions, Visuospatial abilities, Maze learning, Individual differences, Gender differences, Complex tasks, PE61102F, WUAFOSR231309

REPORT NO. CAR-TR-132, CS-TR-1524

CONTRACT NO. F49620-85-K-0009

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-85-0718

UNCLASSIFIED REPORT

ABSTRACT: (U) This document defines an algebraic structure on the paths in a graph based on a coloring of the arcs. Using this structure, basic classes of graphs (trees, hypercubes, arrays, cliques, etc.) are characterized by simple algebraic properties. The structure provides a framework for defining parallel contraction operations on a graph, in which many pairs of nodes are simultaneously collapsed into single nodes, but the degree of the graph does not increase. Such operations are useful in defining systematic strategies for simulating large networks of processors by smaller ones, or in building pyramids of networks. Additional keywords: Applied mathematics; Computer graphics; Computer vision; and Mesh. (Author)

DESCRIPTORS: (U) *ALGEBRA, *GRAPHS, *PATHS, STRUCTURAL PROPERTIES, COMPUTER GRAPHICS, NODES, TREES, APPLIED MATHEMATICS, CONTRACTION, PARALLEL ORIENTATION, STRATEGY, COLORING, MESH

IDENTIFIERS: (U) *Computer vision, PE61102F, WUAFOSR2304A7

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AD-A158 897 6/19

AD-A158 897 CONTINUED

WASHINGTON UNIV SEATTLE

*STRESS(PHYSIOLOGY), *GAS EXCHANGE(BIOLOGY), BLADDERS,
INFLATING, DOGS, REPRINTS

(U) Influence of G-Suit Abdominal Bladder Inflation on Gas
Exchange during +G(z) Stress.

IDENTIFIERS: (U) WUAFOSR2312A3, PE61102F

85 9P

PERSONAL AUTHORS: Modell, H. I. ; Beeman, P. ; Mendenhall, J. ;

CONTRACT NO. F49620-81-C-0055

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-85-0608

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Physiology,
v58 n2 p508-513 1985.

ABSTRACT: (U) Available data relating duration of acceleration stress to blood gas exchange status is limited. Furthermore, studies focusing on pulmonary gas exchange during acceleration stress when abdominal restriction is imposed have yielded conflicting results. To examine the time course of blood gas changes occurring during exposure to acceleration stress in dogs and the influence of G-suit abdominal bladder inflation on this time course, seven spontaneously breathing pentobarbital-anesthetized adult mongrel dogs were exposed to 60 s of up to +5 acceleration stress with and without G-suit abdominal bladder inflation. Arterial and mixed venous blood were sampled for blood gas analysis during the first and last 20 s of the exposure and at 3 min postexposure. Little change in blood gas status was seen at +3 acceleration regardless of G-suit status. However, with G-suit inflation, arterial PO2 fell by a mean of 14.7 Torr during the first 20 s at +4 acceleration ($p < 0.01$, t test) and 20.6 Torr at +5 acceleration ($p < 0.01$). It continued to fall an additional 10 Torr during the next 40 s at both +4 and +5 acceleration. Arterial PO2 was still 5-10 Torr below control values ($p < 0.05$) 3 min postexposure.

DESCRIPTORS: (U) *ACCELERATION, *G SUITS,

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AD-A158 885 11/8

AD-A158 885 CONTINUED

LEHIGH UNIV BETHLEHEM PA DEPT OF METALLURGY AND MATERIALS ENGINEERING

LOADS(FORCES), LOW INTENSITY, MICROSTRUCTURE, PARTICLES, RATES, RESPONSE, SHORT RANGE(TIME), STRESS CONCENTRATION, STRESSES, THRESHOLD EFFECTS, VALUE, FATIGUE(MECHANICS), ROOM TEMPERATURE

(U) Crack Propagation in Powder Metallurgy Hot Isostatically Pressed Nickel-Based Alloy.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 84,

IDENTIFIERS: (U) *Nickel alloy astroloy, WJAFOSR2306A1, PE61102F

MAY 85 33P

PERSONAL AUTHORS: Hertzberg, R. W. ;

CONTRACT NO. AFOSR-83-0029

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-85-0872

UNCLASSIFIED REPORT

ABSTRACT: (U) The room temperature threshold fatigue behavior of P/M HIP'd L.C. Astroloy has been examined. Material with grain sizes ranging from 5 micrometers to 50 micrometers has been tested to investigate the influence of grain size on the threshold response. In disc compact tension specimens grain size is observed to have little influence on the threshold values; in contrast tests conducted in four point bend specimens exhibit lower threshold values. Consideration has also been given to the growth of short cracks under cyclic loading at low stress intensities. The data reveal that under these conditions short cracks propagate at a consistently faster rate than long cracks subject to the same nominal stress intensity. Analytical work has been conducted which suggests that this behavior may be rationalized in terms of a more appropriate driving force for crack extension. Detailed microstructural information has been collected which identifies the major second phase particles present in the alloy. The effect of simple heat treatments on the distribution of these particles has been observed to be negligible. (Author)

DESCRIPTORS: (U) *CRACK PROPAGATION, *POWDER METALS, *NICKEL ALLOYS, CRACKS, CYCLES, DRIVES, FATIGUE(MECHANICS), FORCE(MECHANICS), GRAIN SIZE, HEAT TREATMENT,

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AD-A158 883 CONTINUED

BATTELLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Electrical and Thermal Transport Property Studies of High-Temperature Thermoelectric Materials.

property data obtained during this reporting period for different divalent metal dopants at different concentrations are being used to evaluate the model.

DESCRIPTIVE NOTE: Interim technical rept. 15 May 84-15 May 85.

DESCRIPTORS: (U) *ELECTRICAL CONDUCTIVITY, *THERMAL CONDUCTIVITY, *SEMICONDUCTORS, *RARE EARTH ELEMENTS, FIGURE OF MERIT, HIGH TEMPERATURE, DOPING, SULFIDES, SEEBECK EFFECT, CHROMIUM COMPOUNDS, THERMOELECTRICITY, CRYSTAL LATTICES, CERAMIC MATERIALS, MANGANATES, MODELS, OXIDES

JUN 85 73P

PERSONAL AUTHORS: Bates, J. L.; Griffin, C. W.; Weber, W. J.; Olsen, L. C.;

IDENTIFIERS: (U) Polarons, WUAFDSR2306A2, PE61102F

CONTRACT NO. F49620-83-C-0109

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-85-0723

UNCLASSIFIED REPORT

ABSTRACT: (U) The research effort during this reporting period has continued to emphasize the study of electronically conducting oxides, which was initiated in the previous reporting period. The high-temperature transport property data base has been expanded by continued measurements in several systems under study, and a theoretical model for thermoelectric properties based on a small polaron transport has been developed. The study of the transport properties of the In₂O₃-SnO₂ system, which was initiated during the previous reporting period, has been completed. Low values for the figure of merit were obtained, as expected, for these degenerate-type semiconductors. Some high-temperature materials that exhibit high figures of merit. The theoretical model developed under this program predicts that narrow-band semiconductors with small polaron hopping along inequivalent sites of distorted sublattices can result in increases in both electrical conductivity and Seebeck coefficient with temperature without significant increases in thermal conductivity. High figures of merit, greater than 1.0 at 1000 K, that increases with temperature are predicted by the model. The model is being applied to the divalent metal-doped (Y, La)CrO₃ systems with the AB₂O₃ perovskite structure. Transport

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AD-A158 879

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Number of Bootstrap Simulations Required to Construct a Confidence Interval.

(U) Degenerate Multivariate Stationary Processes: Basicity, Past and Future, and Autoregressive Representation.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

MAR 85

18P

MAY 85

40P

PERSONAL AUTHORS: Hall, P. ;

PERSONAL AUTHORS: Miamee, A. G. ; Pourahmadi, M. ;

REPORT NO. TR-97

REPORT NO. TR-99

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0678

MONITOR: AFOSR
TR-85-0675

UNCLASSIFIED REPORT

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ABSTRACT: (U) The purpose of this document is to make two points about the effect of the number of bootstrap intervals, B , on percentile- t bootstrap confidence intervals. The first point concerns coverage probability; the second, distance of the simulated critical point from the true critical point derived with B -infinity. In both cases the author has in mind applications to smooth statistics, such as the Studentized mean of a sample drawn from a continuous distribution. He indicates the change that have to be made if the distribution of the statistic is not smooth. Additional keywords: Exponential functions.

DESCRIPTORS: (U) *STATISTICAL FUNCTIONS, *EXPONENTIAL FUNCTIONS, STATISTICS, DISTRIBUTION, SIMULATION, INTERVALS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

ABSTRACT: (U) An important problem in prediction theory of weakly stationary stochastic processes (WSSP) is to find conditions on the process, or equivalently on its spectral distribution F , so that the linear least square predictor of a future value of the process admits a mean-convergent series representation in terms of the past (observed) values of the process. Recently, using the notion of positivity of the process. Presently, using the present and the future subspaces of the process it was shown by Pourahmadi that the series representation of the predictor is possible under some weaker conditions. This was made possible by using the idea of angle due to Helson and Szegö for a multivariate extension of this. However these results hold under conditions which require the process to be full rank. The main purpose of this document is to consider the same problem, including their autoregressive representation, for the degenerate WSSP's. Additional keywords: Moving average representation.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, LEAST SQUARES METHOD, LINEAR SYSTEMS, MATHEMATICAL PREDICTION, STATIONARY, STOCHASTIC PROCESSES, THEORY

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 878 12/1

IDENTIFIERS: (U) Moving average representation,
Autoregressive processes, WUAFOSR2304A5, PE61102F

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

(U) Stochastic Integration for Operator Valued Processes
on Hilbert Spaces and on Nuclear Spaces.

DESCRIPTIVE NOTE: Technical rept.,

DEC 84 57P

PERSONAL AUTHORS: Korezlioglu,H. ;Martias,C. ;

REPORT NO. TR-85

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0681

UNCLASSIFIED REPORT

ABSTRACT: (U) The representation of a nuclear space valued square integrable martingale in terms of another nuclear space valued square integrable martingale is given in terms of stochastic integrals of operator valued processes. The construction of the stochastic integral goes through that of operator valued processes on Hilbert spaces. A new approach is given for the Hilbertian case, so that only the integration of Hilbert-Schmidt operator valued processes is needed for the representation of square integrable martingales. Additional keywords: Mathematical prediction; Brownian motion. (Author)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *NUMERICAL INTEGRATION, BROWNIAN MOTION, INTEGRALS, HILBERT SPACE, OPERATORS(MATHEMATICS), MATHEMATICAL PREDICTION

IDENTIFIERS: (U) Nuclear space, Martingales,
WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 876 20/6 20/12

AD-A158 875 6/1

HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

ROCKEFELLER UNIV NEW YORK

(U) Superlattice Optical Bistability Research.

(U) Role of Protein Phosphorylation in Regulation of Bioreactivity.

DESCRIPTIVE NOTE: Annual rept. no. 1, 5 Jul 84-30 Jun 85,

DESCRIPTIVE NOTE: Interim rept. 1 Mar 84-28 Feb 85.

JUN 85 15P

MAR 85 9P

PERSONAL AUTHORS: Tehrani, M. M.; Chow, P.;

PERSONAL AUTHORS: Greengard, P.;

CONTRACT NO. F49620-84-C-0071

CONTRACT NO. AFOSR-84-0086

PROJECT NO. 2305

PROJECT NO. 2312

TASK NO. B4

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0656

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes work performed on a program for fabrication and characterization of nonlinear optical properties of HgCdTe superlattices. We determined early on that performing nonlinear optical experiments (i. e., optical phase conjugation and optical bistability) on such superlattices requires the fabrication of thick > or = 2 micron samples. The growth of thick superlattices with very thin individual layers, on the other hand, can best be accomplished by using an automated MBE (Molecular Beam Epitaxy) system. We launched a major effort to automate our existing MBE system which is due for completion by the end of July 1985. This report also describes the automation design, software, and the computer-controlled hardware.

DESCRIPTORS: (U) *CADMIUM TELLURIDES, AUTOMATION, COMPUTER PROGRAMS, EPITAXIAL GROWTH, MOLECULAR BEAMS, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, LATTICE DYNAMICS, MERCURY COMPOUNDS

IDENTIFIERS: (U) Superlattices, Nonlinear optics, Mercury cadmium tellurides, Bistable optics, MBE (Molecular Beam Epitaxy), WUAFOSR230584, PE61102F

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ABSTRACT: (U) The time courses of synthesis of three neuronal cell-type specific phosphoproteins, Synapsin I, Synapsin III and G-Substrate, were determined in developing rat brains. The appearance of these proteins was concurrent with synapse formation. Two partial cDNA clones for Synapsin I were isolated from a rat brain cDNA expression library and the nucleotidized sequences were determined. The mRNA for these clones was shown to be brain specific. Estimates for the sizes of the potential mRNAs for Synapsin I and Synapsin III were determined. A second rat brain cDNA expression library was generated for screening for synapsin III clones. A monoclonal antibody specific for synapsin III was identified for screening this library. A bovine caudate cDNA and rabbit cerebellar cDNA library were generated for obtaining, respectively, DARPP-32 and G-Substrate cDNA clones. Oligonucleotide probes specific for DARPP-32 and G-Substrate were synthesized for screening these libraries. Originator supplied keywords include: Oligonucleotide; Monoclonal; Synapsin I; Calcium/Calmodulin.

DESCRIPTORS: (U) *PHOSPHORYLATION, *PROTEINS, *PHOSPHOPROTEINS, ANTIBODIES, BRAIN, CALCIUM, CLONES, RABBITS, RATS, SIZES(DIMENSIONS), SYNTHESIS

IDENTIFIERS: (U) *Synapsin 1, *Synapsin 3, WUAFOSR2312A1,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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PEB1102F

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MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) A Graphical Similarity Measure for Time Series Models.

DESCRIPTIVE NOTE: Technical rept.,

APR 85 24P

PERSONAL AUTHORS: Kedem, B. ;

REPORT NO. TR-85-10

CONTRACT NO. AFOSR-82-0187

MONITOR: AFOSR
TR-85-0680

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this document is to introduce a graphical device useful as a measure of similarity or as a goodness of fit criterion for hypothesized time series models. It is based on the actual oscillation observed in time series as depicted by axis-crossings and higher order crossings. Higher order crossings (HOC) are axis-crossings of differenced time series and are closely linked to the spectral content of the series. In fact under the Gaussian assumption, to which we shall adhere, HOC determine the finite dimensional distributions up to a scale parameter given that the mean is zero. The main advantage of HOC is that they are easily obtained from an observed series and that only very few of them are needed, as the discriminatory power in HOC usually diminishes with their order. Higher order crossings in time series discrimination were discussed in Kedem and Slud (1981), (1982), where a certain goodness of fit criterion is suggested. Here however the emphasis is on a graphical device rather than a single test statistic. This graphical method may be shown useful in answering the question 'Does a given time series oscillate as a certain hypothesized model?' Some examples with real and simulated data demonstrate the use and potential of this method.

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, *GRAPHS, CROSSINGS, SIMULATION, MATHEMATICAL MODELS, OSCILLATION, PARAMETERS, SCALE, DISCRIMINATION

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AD-A158 868 11/8 20/8

IDENTIFIERS: (U) Axis(Crossings), WUAFOSR2304A5,
PE61102F

CONNECTICUT UNIV STORRS INST OF MATERIALS SCIENCE

(U) Metallic Glasses: Investigation of Electronic
Structure and its Relationship to Physical Properties.

DESCRIPTIVE NOTE: Final scientific rept. 1 Oct 83-30 Sep
84.

NOV 84 42P

PERSONAL AUTHORS: Hines, W. A. ;

CONTRACT NO. AFOSR-80-0030

PROJECT NO. 2306

TASK NO. C3

MONITOR: AFOSR
TR-85-0722

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the work which was completed during the first four years of the research program (October 1, 1979 to September 30, 1983). Included are: (1) a NMR and magnetic susceptibility study of several rapidly quenched Ni-Pd-P, Ni-Pt-P and Ni-P metallic glasses. (2) a magnetization study of the RE100-xAlx amorphous alloys (where RE is a rare earth element). (3) a NMR, magnetization and x-ray diffraction study of crystalline Fe₃-xNi_{1-x}Si and Metglas 2605 CO (Fe₆₇Co₁₈B₁₄Si₁). (4) a NMR and magnetic susceptibility study of the Ca100-xAlx metallic glass system. (5) a magnetization study of some Co-Nb-B and Fe-Nb-B metallic glasses. (6) an EXAFS study of Metglas 2605 CO and (7) a XANES study of the (Ni_{0.50}Pt_{0.50})₇₅P₂₅ metallic glass system. In addition, this report described in complete detail the progress during the past year (October 1, 1983 to September 30, 1984) which includes: (1) a spin-echo NMR study of the atomic environment in the Fe100-xBx metallic glass system and (2) a low field magnetization study of the magnetic anisotropy in Metglas 2605 CO ribbons. Finally, this report describes the status of experiments currently in progress which includes: (1) optical properties of the Ni100-xPx metallic glasses and (2) Mossbauer study of the Metglas 2605 CO system. Originator supplied keywords include: Electronic

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structure. Density of states. Atomic structure: Specific heat.

STD RESEARCH CORP ARCADIA CA

DESCRIPTORS: (U) *ATOMIC STRUCTURE, *ALLOYS, *GLASS, *ELECTRONIC STATES, AMORPHOUS MATERIALS, MAGNETIZATION, OPTICAL PROPERTIES, PHYSICAL PROPERTIES, RARE EARTH ELEMENTS, SPECIFIC HEAT, X RAY DIFFRACTION, METALS, MAGNETIC PROPERTIES, NUCLEAR MAGNETIC RESONANCE, DENSITY, MOSSBAUER EFFECT

(U) Hypervelocity Plasmas with Strong MHD (Magnetohydrodynamic) Interactions.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 83-31 May 84,

DEC 84 60P

IDENTIFIERS: (U) Metallic glasses, WJAFOSR2306C3, PE61102F

PERSONAL AUTHORS: Demetriades, S. T. ; Maxwell, C. D. ;

REPORT NO. STDR-84-29

CONTRACT NO. F49620-83-C-0115

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0667

UNCLASSIFIED REPORT

ABSTRACT: (U) Use of body forces to inject energy into a plasma offers certain advantages over simple energy addition by Ohmic heating. To achieve ever-increasing levels of energy per unit mass by this strategy requires detailed and thorough understanding of high-interaction magnetohydrodynamics (HMHD) through realistic computer simulation. Such simulation is possible by the existing, HMHD codes provided they undergo further validation in the high-interaction regime through systematic experiments. The present work has carried out a critical assessment of several methods for achieving high-interaction, high-magnetic Reynolds number MHD flows. It indicates that continuous flow (as contrasted to pulsed flow) plasmajet-drive MHD devices offer the greatest advantages and potential for validating the STD/MHD codes at high MHD interaction over a wide range of parameters with the greatest confidence. It has led to the definition of specific plasmajet-driven experiments, utilizing existing equipment, as the most effective way to carry out this task. Keywords: Hypervelocity plasmas; High-interaction, High Reynolds number; Simulation codes; and Validation experiments.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 859 21/8.2 21/2 20/1

DESCRIPTORS: (U) *MAGNETO-HYDRODYNAMICS, *INTERACTIONS, *PLASMAS(PHYSICS), COMPUTERIZED SIMULATION, TEST AND EVALUATION, HIGH RATE, REYNOLDS NUMBER, CODING, ADDITION, ENERGY, SIMULATION, VALIDATION, FLOW, HYPERSONIC VELOCITY, PULSES, MASS, PARAMETERS, RANGE(EXTREMES)

BRIGHAM YOUNG UNIV PROVO UTAH DEPT OF CHEMICAL ENGINEERING

(U) Measurements of Distributed Combustion.

DESCRIPTIVE NOTE: Annual rept. Mar 83-Jun 84,

SEP 84 60P

IDENTIFIERS: (U) PE61101F, WUAFOSR2301A7

PERSONAL AUTHORS: Braithwaite, P. C. ; Beckstead, M. W. ;

CONTRACT NO. AFOSR-83-0157

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0488

UNCLASSIFIED REPORT

ABSTRACT: (U) A modified Rijke burner has been designed and constructed for use in evaluating the influence of particles on acoustic waves. A paddle is used with the burner that can be inserted into the flow field suppressing oscillations on command. Withdrawal of the paddle allows growth of the oscillations. Experimental results obtained using Al and ZrC in the Rijke burner indicate that both additives cause an increase in the acoustic growth rate when compared to growth rates obtained without any particles in the system. The increase caused by Al is greater than that caused by ZrC. Because the reaction of Al releases more than twice the energy ZrC does, it would be expected to have a greater influence on the system than ZrC. The increase in the acoustic growth rate is the result of energy being added to the system by the distributed combustion of the particles. The increase in the acoustic growth rate due to distributed combustion was found to be directly related to the heat of reaction.

DESCRIPTORS: (U) *SOLID PROPELLANT ROCKET ENGINES, *COMBUSTION STABILITY, SOLID ROCKET PROPELLANTS, OSCILLATION, ACOUSTIC ATTENUATION, SUPPRESSORS, ADDITIVES, FREQUENCY, ALUMINUM, ZIRCONIUM COMPOUNDS, CARBIDES, GRAPHITE, ACOUSTIC WAVES, PARTICLES, DAMPING, BURNERS

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 859 CONTINUED

AD-A158 839 6/3

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A1

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) The Role of the Extraocular Muscles in the Rabbit Nictitating Membrane Response: A Re-Examination.

84 9P

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

CONTRACT NO. AFOSR-83-0215

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-85-0601

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Behavioral Brain Research, v14 p81-84 1984.

ABSTRACT: (U) Berthier and Moore showed that the rabbit nictitating membrane (NM) response principally results from contracting the retractor bulbi muscle which pulls the globe into the socket thereby passively effecting NM extension. They concluded that the remaining extraocular muscles an effect NM extension if the retractor bulbi is denervated. A re-examination of the role of the recti and oblique extraocular muscles in nictitating membrane extension was undertaken in the light of recent results of Marek et al., suggesting that the facial nerve, and not the extraocular muscles, participates in extension of the NM. In contrast to Marek et al., the present results indicated that section of the extraocular muscles was necessary to abolish eyeshock or tactilly elicited NM extension when the abducens and facial nerves were severed. It is therefore likely that extraocular (recti and oblique) muscles participate in globe retraction and NM extension, as originally noted by Lorente de No.

DESCRIPTORS: (U) *EYE. *MUSCLES. RABBITS. NEUROPHYSIOLOGY, REFLEXES, MEMBRANES(BIOLOGY), CONDITIONED RESPONSE, STIMULATION(PHYSIOLOGY), REPRINTS

IDENTIFIERS: (U) Extraocular muscles, Nictitating membrane, Eye blink, Eye lids, WJAFOSR23123A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 825 17/8 20/5 4/2 AD-A158 825 CONTINUED

FAME ASSOCIATES INC FORT COLLINS CO

(U) Optical/Infrared Properties of Atmospheric Aerosols with an In-Situ, Multi-Wavelength, Multichannel Nephelometer System.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-14 Mar 85 on Phase I.

APR 85 63P

PERSONAL AUTHORS: Wedding, J. B. ; Kim, Y. J. ; Weigand, M. A.

REPORT NO. FA-AF-14385

CONTRACT NO. F49620-84-C-0101

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR TR-85-0506

UNCLASSIFIED REPORT

ABSTRACT: (U) There exists a need to develop new instrumentation which can provide an in-situ, real time measurement of the total differential scattering patterns from individual airborne particles of different composition and shape under natural and man-made atmospheric conditions. During the Phase I study, a literature survey was conducted, system requirements developed for an in-situ, multi-wavelength, multichannel nephelometer system, and technical feasibilities were investigated. Finally, design parameters of the nephelometer system including the particle sampling inlet, the optical system, and the data acquisition system were optimized. The proposed nephelometer system will measure the differential scattering patterns of individual aerosol particles at three laser wavelengths, in three scattering planes. Successful development of such an instrument during the Phase II efforts will assist in filling the void of knowledge of the optical/infrared properties of atmospheric aerosols and their interactions with electromagnetic radiation fields. (Author)

DESCRIPTORS: (U) *AEROSOLS, *NEPHELOMETERS, MULTISPECTRAL, EARTH ATMOSPHERE, ELECTROMAGNETIC SCATTERING, LIGHT SCATTERING, INFRARED RADIATION, PARTICLES, DATA ACQUISITION, ELECTROMAGNETIC FIELDS, ELECTROMAGNETIC RADIATION, MULTICHANNEL, INSTRUMENTATION, OPTICAL EQUIPMENT, AIRBORNE, DIFFERENTIAL CROSS SECTIONS, PATTERNS, SCATTERING, LITERATURE SURVEYS, INLETS, SAMPLING, MEASUREMENT, REAL TIME, FREQUENCY, LASERS, OPTICAL PROPERTIES

IDENTIFIERS: (U) Atmospheric aerosols, Multiwavelength nephelometers, PEG5502F, WJAFOSR3005A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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PITTSBURGH UNIV PA DEPT OF CHEMISTRY

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

were measured indirectly. The 180 + NO or O2 isotope exchange reactions were measured, and the results compared with measured and calculated high-pressure limits of the respective recombinations and with NO vibrational relaxation.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 80-28 Feb 85,

DESCRIPTORS: (U) *REACTION KINETICS, *GASES, MOLECULAR VIBRATION, ENERGY TRANSFER, EXCITATION, HYDROGEN FLUORIDE, HYDROGEN CHLORIDE, LASER INDUCED FLUORESCENCE, ISOTOPE EXCHANGE, RELAXATION, DIATOMIC MOLECULES

MAY 85 11P

PERSONAL AUTHORS: Kaufman, F. ;

REPORT NO. SQ08671-84-00661

CONTRACT NO. AFOSR-80-0207

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-85-0503

UNCLASSIFIED REPORT

ABSTRACT: (U) The vibrational energy transfer of highly excited HCl and HF was studied by the infrared chemiluminescence method in a series of five papers. HCl($v < \text{or} = 7$) and HF($v < \text{or} = 7$) were produced by fast generating reactions, e.g. H + ICl yields ($v < \text{or} = 7$) + I or H + F2 yields ($v < \text{or} = 7$) + F in large excess He which relaxes the rotational but not the vibrational excitation. With various added quencher gases, about 200 rate constants for stepwise vibrational energy transfer were measured. They tend to increase rapidly with increasing v , often independent of the vibrational energy defect. For HF (v) + HF (0), self-relaxation, the V-V channel decreases from 55% at $v=2$ to zero at $v > 5$ even though the relaxation rate constant rises as v to the 2.7 power. A versatile flow reactor system was built that features three detection methods (laser-induced fluorescence, vacuum u.v. resonance fluorescence, and modulated molecular beam mass spectrometry) plus upstream radical production by IR laser multiphoton decomposition. The NH2 + NO and CH3O + NO2 reactions were studied successfully. The latter was found to have a recombination (CH3ONO2) and disproportionation (CH2O + HNO2) channel and both

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RANDOM APPLICATIONS INC MONTROSE CO

SOLUTIONS(GENERAL), PARAMETERS

(U) Applications of Differential Phase Statistics to Studies of C3 and Spread Spectrum Communications.

DESCRIPTIVE NOTE: Final rept..

85 4P

PERSONAL AUTHORS: Pawla.R. F. ;

CONTRACT NO. F49620-83-C-0085

MONITOR: AFOSR
TR-85-0555

UNCLASSIFIED REPORT

ABSTRACT: (U) Three reports have been written under this second year of the contract and are listed in the next section as Papers No. 6, 7, 8. Paper No. 6 addresses the classical and very complicated problem of finding the probability density function at the output of an RC filter when the input is a binary random telegraph signal whose intervals are described by a renewal process. Paper No. 7 focuses on a particular case in which the desired probability density is the solution of a rather formidable third-order differential equation with non-constant coefficients. A closed form solution is found for one special value of a system characteristics parameter, and a series solution is obtained for general values of the this parameter. Paper No. 8 is concerned with developing methods for calculating the solution to a fourth order differential equation. Although the theory of such equations is well known, a prohibitive amount of algebra is required to determine the coefficients in series solutions, and a computer method is developed in which the algebra is circumvented. The method is quite general, and in an appendix is applied to Bessel's differential equation and, quite surprisingly, a new second solution to Bessel's equation is obtained which does not appear to have been previously noticed.

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS.
*SPREAD SPECTRUM, *TELEGRAPH SYSTEMS, ALGEBRA, COMPUTERS, STATISTICS, VALUE, COEFFICIENTS, VARIATIONS, PROBABILITY DENSITY FUNCTIONS, SIGNALS, DIFFERENTIAL EQUATIONS, SOLUTIONS(GENERAL), SERIES(MATHEMATICS).

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L-homocysteate decline steadily between postnatal days 11 to 30, at which time adults values are reached.

(U) Classification and Properties of Acidic Amino Acid Receptors in Hippocampus. III. Supersensitivity during the Postnatal Period and Following Denervation.

DESCRIPTORS: (U) *AMINO ACIDS, *CHEMORECEPTORS, HIPPOCAMPUS, CLASSIFICATION, SENSITIVITY, NEUROCHEMICAL TRANSMISSION, INTERACTIONS, SODIUM, RATS, REPRINTS

83 8P

IDENTIFIERS: (U) Glutamate, PE61102F, WUAFOSR2312A3

PERSONAL AUTHORS: Baudry, M.; Kramer, K.; Lynch, G.;

CONTRACT NO. AFOSR-82-0116, NSF-BNS81-12156-01

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-85-0603

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Molecular Pharmacology, v24 p229-234 1983.

ABSTRACT: (U) The effects of excitatory amino acids on Na efflux rate in rat hippocampal slices were determined at various postnatal days and following removal of a major afferent system. Two weeks after a unilateral hippocampal aspiration, the Na efflux induced potassium ions, D-glutamate, N-methylaspartate, and kainate is significantly decreased in the contralateral intact hippocampus whereas the effect of L-glutamate is substantially increased. Analysis of concentration-response curves suggests that the increased responsiveness to L-glutamate is due to an increase in the maximal effect rather than to changes in the half-maximal concentration for the amino acid. Partial denervation does not detectably change efflux elicited by D, L-homocysteic acid nor does it modify the properties of (3H) glutamate binding to hippocampal membranes. The effects of potassium ions, N-methylaspartate, and kainate but not of D,L-homocysteate are significantly decreased in slices incubated in the absence of calcium. All the amino acids tests are considerably more potent in slices prepared from 11-day-old rats than in those from adult rats; the differences in responsiveness reflect an increase in maximal effect without changes in the half-maximal concentration. The responses to L-glutamate and D,

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AD-A158 800 6/18 5/10 5/9 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A158 800 CONTINUED

NORTHWESTERN UNIV EVANSTON IL

(U) Enhancing Sensitivity to Visual Motion and Enhancing
Visual Sensitivity.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 81-30 Sep 83.

JUN 85 28P

PERSONAL AUTHORS: Sekuler, R. ;

CONTRACT NO. AFOSR-80-0246

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-85-0688

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress made from October 1, 1981 to September 30, 1983. During this period work proceeded on three main lines of study: 1) various aspects of visual motion perception, 2) collaborative work on contrast sensitivity and pilots' performance in aircraft simulators, and 3) individual differences in responses to temporal transients. The most extensive of the three work-units dealt with motion perception by human observers. The main findings include the following: 1) Perceived speed of a moving target varies with that target's contrast and retinal eccentricity. In particular, many targets undergo illusory slowing when they appear in the periphery in the visual field. 2) Detection of a moving target is often dissociated from the ability to identify the direction in which the target moves. In particular, the accuracy with which target direction can be judged, even for highly visible targets, seems to far less good than previously suspected. 3) Relatively small amounts of training can significantly improve an observer's ability to discriminate between two highly similar directions of target motion. Moreover, this effect is well-restricted to the training direction and other, similar directions; the training effect is retained without decrement for at least two months. The results suggest that this improvement with training represents a genuine change in visual function.

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DESCRIPTORS: (U) *MOVING TARGETS, *SPACE PERCEPTION, *VISUAL TARGETS, *VISUAL PERCEPTION, ACCURACY, DETECTION, HUMANS, OBSERVERS, ECCENTRICITY, RETINA, TARGETS, FLIGHT SIMULATORS, ORIENTATION(DIRECTION), MOTION, PERCEPTION, MOTION, SENSITIVITY, VISION, CONTRAST, TRAINING, RESPONSE, REACTION(PSYCHOLOGY), SKILLS, FLIGHT CREWS, TARGET DETECTION, DISCRIMINATION, VELOCITY, PERIPHERAL VISION, OPTIMIZATION

IDENTIFIERS: (U) Individual differences, *Motion perception, WUAFOSR2312A5, PE61102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 799 5/10 6/16

NORTHWESTERN UNIV EVANSTON IL

(U) Enhancing Visual Sensitivity.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.

MAY 85 36P

PERSONAL AUTHORS: Sekuler, R. ;

CONTRACT NO. AFOSR-80-0246

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0663

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the major studies carried out under AFOSR grant 80-0246 from October 1, 1983 through September 30, 1984. During this report period we did coordinated work on two aspects of motion perception. One work unit extended our earlier research on how training affects direction discrimination. These studies give new insights into the physiological locus and character of this particular form of perceptual learning. The second work unit exploited perceptual confusions among motion metamers in order to develop a quantitative model of the mechanisms that underlie human direction perception. The model is built around a small number (n=12) of broadly-tuned directionally-selective mechanisms. This model gives an excellent account of the experiments with motion metamers. (Author)

DESCRIPTORS: (U) *LEARNING, *VISUAL PERCEPTION, *SPACE PERCEPTION, DISCRIMINATION, HUMANS, LOCUS, MODELS, MOTION, PERCEPTION, PERCEPTION(PSYCHOLOGY), PHYSIOLOGY, SENSITIVITY, VISION, VISUAL TARGETS, PSYCHOPHYSIOLOGY, SKILLS, PERFORMANCE(HUMAN)

IDENTIFIERS: (U) *Motion perception, Metamerism,
WUAFOSR2312A5, PE61102F

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IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Trifluoramine Oxide with Nitric Oxide: A Facile In Situ Source of Nitrosyl Fluoride.

84 5P

PERSONAL AUTHORS: Kinkead, S. A. ; Shreeve, J. M. ;

CONTRACT NO. AFOSR-82-0247

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-0510

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Inorganic Chemistry, V23 n25 p4174-4177 1984.

ABSTRACT: (U) Trifluoramine oxide (NF₃O) has been found to react rapidly with nitric oxide to give nitrosyl fluoride (FNO). A free-radical reaction involving the known difluoronitryl (F₂NO) radical is proposed as a plausible mechanism. This reaction has been used as an in situ source of nitrosyl fluoride to synthesize the previously unknown nitroso compounds Rf(CF₃)CFNO (R = N-C₅H₁₁, SF₅, OC₂F₅).

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *FLUORIDES, *NITRO RADICALS, FLUORINE COMPOUNDS, AMINES, OXIDES, NITROGEN OXIDES, NITROGEN COMPOUNDS, REPRINTS

AD-A158 795

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 794 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Perfluorocycloalkyl(Aryl) Diazenes from
Heptafluoronitrosocyclobutane and
Nonafluoronitrosocyclopentane.

85 11P

PERSONAL AUTHORS: Marsden, H. M. ; Shreeve, J. M. ;

CONTRACT NO. AFOSR-82-0247, NSF-CHE81-00158

MONITOR: AFOSR
TR-85-0512

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,
v27 p275-284 1985.

ABSTRACT: (U) The perfluoronitrosocycloalkanes,
heptafluoronitrosocyclobutane and
nonafluoronitrosocyclopentane, are convenient precursors
to a family of new perfluorocycloalkyl(aryl) diazenes.
With aniline and o-aminobenzamide, (CF₂)(CF₂)xCFN=NC(CH)
4CH and CF₂(CF₂)xCFN=NC(CH)4CC(O)NH₂ (x = 2,3) are formed.
Additionally, heptafluoronitrosocyclobutane gives CF₂(CF₂)
2CFN=NCCFCFCFCF and CF₂(CF₂)2CFN=NC(CH)4CNH₂ with 2,3,5,
6-tetrafluoroaniline and o-phenylenediamine.

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *CYCLIC
COMPOUNDS, *FLUORINE COMPOUNDS, *ALKYL RADICALS, ARYL
RADICALS, NITROSO COMPOUNDS, BUTANES, PENTANES, REPRINTS

IDENTIFIERS: (U) *Dazenes, PE61102F

AD-A158 793 20/13

RENSELAEER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL
SCIENCES

(U) Dynamics of First Order Phase Transitions.

84 42P

PERSONAL AUTHORS: Slemrod, M. ;

CONTRACT NO. AFOSR-81-0172

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0543

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Phase Transformations and
Material Instabilities in Solids, p163-203 1984.

ABSTRACT: (U) This paper considers continuum
thermodynamics of first order phase transitions.
Specifically we study the role of viscosity, capillarity,
and heat conduction and the relation of these effects to
interphase wave propagation.

DESCRIPTORS: (U) *PHASE TRANSFORMATIONS, TRANSITIONS,
THERMAL CONDUCTIVITY, CAPILLARITY, VISCOSITY,
THERMODYNAMICS, CONDUCTION(HEAT TRANSFER), ONE
DIMENSIONAL, WAVE PROPAGATION, REPRINTS

IDENTIFIERS: (U) Interphase wave propagation, Continuum
thermodynamics, Phase transitions, WUAFOSR2304A1,
PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
AD-A158 792 CONTINUED

AD-A158 792 21/8.1 21/9.1

PRINCETON UNIV NJ

(U) Criteria for Ignition in Monopropellant Engines.

APR 85 4P

DESCRIPTORS: (U) *LIQUID PROPELLANT ROCKET ENGINES.
*IGNITION. *MONOPROPELLANTS, NITROMETHANE, CATALYSTS,
TEST REACTORS, TEMPERATURE, REACTION KINETICS, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303D9, PE61102F

PERSONAL AUTHORS: Benziger, J. B. ; Strong, J. E. ;

CONTRACT NO. AFOSR-82-0099

PROJECT NO. 2303

TASK NO. D9

MONITOR: AFOSR
TR-85-0533

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Spacecraft and
Rockets, v22 n2 p217-218 Mar-Apr 85.

ABSTRACT: (U) Hydrazine-based monopropellants are a mature technology. Because of suspected carcinogenicity of hydrazine the feasibility of nitromethane-based monopropellants has been studied. Nitromethane-based systems can deliver high specific impulse; but the high adiabatic decomposition temperature limits the choice of catalyst material to metal oxides that exhibit significant activation barriers for reaction, necessitating a catalyst bed preheat to function. For two of the best catalysts, NiO and Cr2O3, a minimum catalyst bed preheat temperature for ignition was observed. Furthermore, the response time of the pressure exhaust time of the pressure exhaust from the catalyst bed was optimal at intermediate values of fuel flow and catalyst bed preheat. In this Note we present a model that can account for those observations and provide guidelines for operation of nitromethane-based monopropellant systems. The monopropellant reactor is a packed bed catalytic reactor. The system is adequately described as an adiabatic, plug flow, two phase reactor. The two performance criterion we were interested in were (1) the operating conditions for lightoff and sustained operation, and (2) the operating parameters to optimize the response time. Reactor performance was examined for three design and control parameters: fuel feed rate, feed temperature, and bed pre-heat temperature.

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AD-A158 791 CONTINUED

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Surface Coordination Chemistry of Platinum Studies by Thin-Layer Electrodes. Adsorption, Orientation, and Mode of Binding of Aromatic and Quinonoid Compounds,

Chemisorption series for the various organic functional groups investigated. The effect of temperature on surface properties has been described in terms of perturbations to the preferred modes of attachment.

85 10P

DESCRIPTORS: (U) *SURFACE CHEMISTRY, *PLATINUM, *ABSORPTION, INFRARED SPECTROSCOPY, ELECTRODES, AROMATIC COMPOUNDS, QUINONES, ELECTROCHEMISTRY, REPRINTS

PERSONAL AUTHORS: Sorlaga, M. P. ; Binamira-Sorlaga, E. ; Hubbard, A. T. ; Benziger, J. B. ; Pang, K. W. P. ;

IDENTIFIERS: (U) WUAFOSR2303A2, PE61102F

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0521

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v24 p85-73 1985.

ABSTRACT: (U) Extensive studies on the interaction of 54 aromatic and quinonoid compounds with smooth Pt thin-layer electrodes have yielded data that serve to establish the surface coordination chemistry of polycrystalline Pt with these compounds in aqueous solutions. Absorption of the subject compounds occurred spontaneously and irreversibly at specific orientations which depended on their characteristic molecular structures and concentrations. C. These orientations which have been represented in terms of modes of coordination derived from model compounds; supportive electrochemical and infrared spectroscopic data are presented. For simple o- and p-diphenols or quinones, adsorption at C < or = 0.1 mM produced flat-oriented (pi-bonded) quinone intermediates; adsorption at C < or = mM resulted in edge-oriented (di-pi-bonded) diphenolic species. When the Pt surface was purposely pretreated with pi-bonded intermediates, severe reorientation retardation was observed, indicating that absorption from concentrated solutions does not involve coordination in the flat orientation as an intermediate step. Substituents on or heteroatoms in the aromatic/quinonoid ring altered its surface coordination properties to varying degrees; analysis of the absorption/orientation data enabled the formulation of a strength-of-

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AD-A158 790 7/3

AD-A158 789 6/16 5/10

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

NORTHWESTERN UNIV EVANSTON IL

(U) The Reaction of Magnesium with cis-1,3,5-Tri(bromomethyl)cyclohexane. Evidence for a Soluble Tri-Grignard.

(U) Motion Processing in Peripheral Vision: Reaction Time and Perceived Velocity.

85 4P

82 9P

PERSONAL AUTHORS: Boudjouk, P. ; Sooriyakumaran, R. ; Kapfer, C. A. ;

PERSONAL AUTHORS: Tynan, P. D. ; Sekuller, R. ;

CONTRACT NO. AFOSR-84-0008

CONTRACT NO. AFOSR-80-0246

PROJECT NO. 2303

PROJECT NO. 2312

TASK NO. B2

TASK NO. A3

MONITOR: AFOSR
TR-85-0570

MONITOR: AFOSR
TR-85-0607

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v281 pc21-C23 1985.

SUPPLEMENTARY NOTE: Pub. in Vision Research, v22 p61-68 1982.

ABSTRACT: (U) The reaction of magnesium with cis-1,3,5-tris(bromomethyl)cyclohexane in tetrahydrofuran gives good yields of a soluble tri-Grignard reagent. This intermediate was characterized by reactions with water, trimethylchlorosilane and methyltrichlorosilane.

ABSTRACT: (U) Reaction time to motion onset were measured as a function of eccentricity of presentation. These were compared with measurements of perceived speed at various eccentricities. For slowly moving targets, both dependent measures changes substantially with eccentricity: RT increased and perceived speed declined. For more rapidly moving targets, both dependent measures were unchanged by eccentricity. These results may be related to the difference between retinotopic distribution of neural mechanisms responsive to low rates of temporal modulation and the retinotopic distribution of neural mechanisms responsive to higher rates of temporal modulation.

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *GRIGNARD REAGENTS, MAGNESIUM, HEXANES, CYCLIC COMPOUNDS, BROMINE COMPOUNDS, METHYL RADICALS, SILICON COMPOUNDS, REPRINTS

DESCRIPTORS: (U) *PERIPHERAL VISION, VISUAL PERCEPTION, REACTION TIME, ECCENTRICITY, VELOCITY, MOTION, SIMULATION, IMAGE PROCESSING, MOVING TARGETS, RETINA, PSYCHOPHYSICS, REPRINTS

IDENTIFIERS: (U) Motion analysis, WUAFOSR2312A3, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 788 6/16 5/10
NORTHWESTERN UNIV EVANSTON IL

(U) Detection and Identification of Moving Targets,

83 11P

PERSONAL AUTHORS: Ball, K. ; Sekuler, R. ; Machamer, J. ;

CONTRACT NO. AFOSR-80-0248

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-85-0610

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v23 n3 p229-238 1983.

ABSTRACT: (U) Though they could distinguish a moving target from a blank field, subjects in earlier work often greatly misperceived the direction of the movement. This observation was followed up in three experiments comparing detection of moving random-dot patterns to identification of the patterns' direction of movement. Two different theoretical treatments indicate that in order to be detected by entirely independent mechanisms, two directions must differ by at least 120 deg.

DESCRIPTORS: (U) *VISUAL PERCEPTION, *MOVING TARGETS, SPACE PERCEPTION, DETECTION, DISCRIMINATION, PERCEPTION(PSYCHOLOGY), IDENTIFICATION, VISUAL TARGETS, MOTION, DIRECTIONAL, PERFORMANCE(HUMAN), REPRINTS

IDENTIFIERS: (U) Motion perception, WUAFOSR2312A3, PES1102F

AD-A158 776 20/4 12/1
FLORIDA UNIV GAINESVILLE

(U) Far-Field Boundary Conditions in Numerical Solutions of the Navier-Stokes Equations.

DESCRIPTIVE NOTE: Final rept. 24 Oct 84-1 Apr 85.

MAY 85 61P

PERSONAL AUTHORS: McKenna, P. J. ;

CONTRACT NO. AFOSR-83-0330

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0625

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this project was to investigate the artificial boundary conditions which must be imposed at the boundary of a numerical grid. Numerical experiments were performed which evaluated various boundary conditions of this type. Of particular interest was the question of whether linearization around the flow at infinity provides an adequate choice of boundary condition for the fully nonlinear equations. Inflow-outflow conditions as well as several choices of periodic boundary conditions were considered. The inflow-outflow conditions worked reasonably well for two dimensional problems. For the periodic conditions, results were mixed. Concerns about over specification when using pure periodic conditions proved to be groundless. However, the method failed when attempting to use periodicity in the two sideways traveling periodic waves. Additional keywords: Computational fluid dynamics; Fluid flow; Two dimensional flow; Compressible flow.

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, *BOUNDARY VALUE PROBLEMS, BOUNDARIES, COMPRESSIBLE FLOW, FAR FIELD, LINEARITY, NONLINEAR ALGEBRAIC EQUATIONS, GRIDS, NUMERICAL ANALYSIS, TWO DIMENSIONAL FLOW, FLUID FLOW, NUMERICAL METHODS AND PROCEDURES, SOLUTIONS(GENERAL), TWO DIMENSIONAL, PERIODIC VARIATIONS, TRAVELING WAVES, COMPUTATIONS, FLUID DYNAMICS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 769 7/4 20/5

IDENTIFIERS: (U) Inflow outflow conditions,
Computational fluid dynamics, PE61102F, WUAF0SR2304A3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES CENTER FOR
LASER STUDIES

(U) Subnanosecond Short Wavelength Generation Using
Optical Fibers.

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

FEB 85 17P

PERSONAL AUTHORS: Garmire, E. ;

CONTRACT NO. F49620-84-C-0016

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0491

UNCLASSIFIED REPORT

ABSTRACT: (U) A one-year study of nonlinear optical effects in fibers using UV lasers investigated stimulated Raman scattering. Lines were seen due to quartz in fibers and due to organic liquids in liquid-filled capillaries. Benzene formed a waveguide, but in preliminary experiments only 1% was converted to stimulated Stokes scattering. Of particular interest was the discovery of Raman scattering of the Nitrogen laser light from the nitrogen vibrational transitions within the laser itself. Such lines have never been reported before. Of additional interest was the multi-line spectral broadening of the stimulated Raman spectra observed from quartz fibers. The reason for this broadening remains to be investigated. Preliminary experiments were performed and apparatus designed which sets the stage for further research into the higher power UV properties of fibers. Keywords include: UV, optical fibers, waveguides, nonlinear optics pulses, and stimulated Raman effect.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *FIBER OPTICS, *RAMAN SPECTRA, *ULTRAVIOLET LASERS, BENZENE, LASERS, NITROGEN, TRANSITIONS, VIBRATION, OPTICS, PULSES, QUARTZ, LIGHT SCATTERING, RAMAN SPECTRA, HIGH POWER, ULTRAVIOLET RADIATION, LASER BEAMS, NITROGEN LASERS, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, FIBERS, STIMULATION(GENERAL).

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 762 12/1

WAVEGUIDES

WISCONSIN UNIV-MILWAUKEE

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1

(U) Sieves and a Filter for Gaussian Processes.

DESCRIPTIVE NOTE: Research progress rept..

APR 85 5P

PERSONAL AUTHORS: Beder, J. ;

CONTRACT NO. AFOSR-84-0329

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0621

UNCLASSIFIED REPORT

ABSTRACT: (U) Results are reported on the first two conjectures that were to be investigated as described in the research proposal. Conjecture 1 has been established and follow-on results are obtained. What remains to be investigated is the use of these results to make confidence statements and to test hypotheses. Results which establish the truth of conjecture 2 are also reported. Additional keywords: Theorems; Estimates; Covariance; Convergence. (Author)

DESCRIPTORS: (U) *MATHEMATICAL ANALYSIS, HYPOTHESES, THEOREMS, ESTIMATES, COVARIANCE, CONVERGENCE

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
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MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL
INTELLIGENCE LAB

PERCEPTION, VISIBLE SPECTRA, CLASSIFICATION

(U) Color Vision: Representing Material Categories.

IDENTIFIERS: (U) Image understanding, Color theory,
WUAFOSR2313A5, PE61102F

MAY 84 38P

PERSONAL AUTHORS: Rubin, J. M.; Richards, W. A.;

REPORT NO. AI-M-764

CONTRACT NO. F49620-83-C-0135, NSF-WCS79-23110

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0586

UNCLASSIFIED REPORT

ABSTRACT: (U) We argue that one of the early goals of color vision is to distinguish one kind of material from another. Accordingly, we show that when a pair of image regions is such that one region has greater intensity at one wavelength than at another wavelength, and the second region has the opposite property, then the two regions are likely to have arisen from distinct materials in the scene. We call this material change circumstance the 'opposite slope sign condition.' With this criterion as a foundation, we construct a representation of spectral information that facilitates the recognition of material changes. Our theory has implications for both psychology and neurophysiology. In particular, Hering's notion of opponent colors and psychologically unique primaries, and Land's results in two-color projection can be interpreted as different aspects of the visual system's goal of categorizing materials. Also, the theory provides two basic interpretations of the function of double-opponent color cells described by neurophysiologists. Keywords include: Image understanding; Vision; Color vision; Color theory.

DESCRIPTORS: (U) *COLOR VISION, COLORS, THEORY, MATERIALS, IMAGES, REGIONS, RECOGNITION, VISION, FREQUENCY, INTENSITY, NEUROPHYSIOLOGY, PSYCHOLOGY, SPECTRA, DISCRIMINATION, IMAGE PROCESSING, VISUAL

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MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL INTELLIGENCE LAB

intelligence.

(U) Codon Constraints on Closed 2D Shapes.

DESCRIPTORS: (U) *CURVATURE, TWO DIMENSIONAL, REDUNDANCY, ARTIFICIAL INTELLIGENCE, CONTOURS, APPLIED MATHEMATICS, SHAPE, POWER

MAY 84 25P

IDENTIFIERS: (U) *Codons, Image understanding, Shape representation, MUAFOSR2313A5, PE61102F

PERSONAL AUTHORS: Richards, W. A. ; Hoffman, D. D. ;

REPORT NO. AI-N-769

CONTRACT NO. F49620-83-C-0135

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-85-0588

UNCLASSIFIED REPORT

ABSTRACT: (U) Codons are simple primitives for describing plane curves. They thus are primarily image-based descriptors. Yet they have the power to capture important information about the 3D world, such as making part boundaries explicit. The codon description is highly redundant (useful for error-correction). This redundancy can be viewed as a constraint on the number of possible codon strings. For smooth closed strings that represent the bounding contour (silhouette) of many smooth 3D objects, the constraints are so strong that sequences containing 6 elements yield only 33 generic shapes as compared with a possible number of 15,625 combinations. An important task for object recognition is the description of the shape of a bounding contour such as a silhouette that outlines an object. Although recognition need require only partial segments of such contours, the internal canonical description, against which the image contour is compared, is very likely a closed ring. Our concept of most objects should lead us to expect such a closed contour. The description of closed, 2D contours thus is an important ingredient of a system for object recognition. First the author presents a scheme, described in more detail elsewhere and then show how the scheme leads to a hierarchical taxonomy of closed, 2D shapes. Additional keywords: Image understanding; Shape representation; Applied mathematics; Artificial

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AD-A158 740 12/1 NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES Gaussian sequences, WUAF05R2304A5, PE61102F

(U) Basic Properties of Strong Mixing Conditions.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.

JUN 85 41P

PERSONAL AUTHORS: Bradley, R. C. ;

REPORT NO. TR-102

CONTRACT NO. F49620-82-C-0009, NSF-DMS84-01021

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0619

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Indiana Univ., Bloomington. Dept. of Mathematics.

ABSTRACT: (U) This is a survey of the basic properties of strong mixing conditions for sequences of random variables. The focus will be on the structural properties of these conditions, and not at all on limit theory. For a discussion of central limit theorems and related results under these conditions, the reader is referred to Peligrad or Iosifescu. This survey will be divided into eight sections as follows: 1) Measures of dependence; 2) Five strong mixing conditions; 3) Mixing conditions for two or more sequences; 4) Mixing conditions for Markov chains; 5) Mixing conditions for Gaussian sequences; 6) Some other special examples; 7) The behavior of the dependence coefficients; and 8) Approximation of mixing sequences by other random sequences. Additional keyword: Stationary. (Author)

DESCRIPTORS: (U) *MIXING, *RANDOM VARIABLES, MARKOV PROCESSES, SEQUENCES, STRUCTURAL PROPERTIES, THEORY, APPROXIMATION(MATHEMATICS), STATIONARY

IDENTIFIERS: (U) Strong mixing conditions, Markov chains,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 739 12/1

GEORGIA INST OF TECH ATLANTA

(U) Partitions of Point Processes: Multivariate Poisson Approximations.

DESCRIPTIVE NOTE: Technical rept..

MAY 85 25P

PERSONAL AUTHORS: Serfozo, R. F. ;

CONTRACT NO. AFOSR-84-0387

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0828

UNCLASSIFIED REPORT

ABSTRACT: (U) This study shows that when a point process is partitioned into certain uniformly sparse subprocesses, then the subprocesses are asymptotically multivariate Poisson or compound Poisson. Bounds are given for the total-variation distance between the subprocesses and their limits. Several partitioning rules are considered including independent, Markovian, and batch assignments of points. Additional keywords: Weak convergence; Theorems. (Author)

DESCRIPTORS: (U) *POINTS(MATHEMATICS), POISSON DENSITY FUNCTIONS, APPROXIMATION(MATHEMATICS), MULTIVARIATE ANALYSIS, WEAK CONVERGENCE, THEOREMS

IDENTIFIERS: (U) *Partitions(Mathematics), *Partitioning, WJAFOSR2304A5, PE61102F

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AD-A158 735 6/16
SMITH-KETTLEWELL INST OF VISUAL SCIENCES SAN FRANCISCO CALIF

(U) The Spatial and Temporal Parameters of Velocity Discrimination.

DESCRIPTIVE NOTE: Annual rept. 1 Apr-30 Sep 84.

DEC 84 8P

PERSONAL AUTHORS: McKee, S. P. ;

CONTRACT NO. AFOSR-82-0345

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0572

UNCLASSIFIED REPORT

ABSTRACT: (U) The target duration required for the precise discrimination of velocity is quite short, amounting to about 100 msec for a single moving dot or line target. While stroboscopic motion is an adequate substitute for continuous motion in velocity discrimination, optimal discrimination depends on the use of a strobe rate greater than 10 Hz. Generally human observers have difficulty detecting acceleration in moving targets. Over small distances (0.5-1 deg), timing signals from adjacent targets presented in a sequence are pooled, so that information about their relative onset time is lost. For example, given three adjacent lines, separated spatially by 0.1 deg and presented in a sequence (apparent motion) observers are unable to discriminate between a sequence in which a 10 msec interval separates the second from the reverse order (30 msec followed by 10 msec). Velocity discrimination is not affected by blur. Sinusoidal grating targets of 3 cpl/deg or lower produce excellent discrimination. Sinusoidal gratings above 3 cycles per degree in spatial frequency are not adequate for fast velocities (> 1 deg/sec).
Keywords: Motion human performance; Velocity discrimination; Acceleration detection vision.

DESCRIPTORS: (U) *DISCRIMINATION, *VISUAL PERCEPTION,

AD-A158 735

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ACCELERATION, DETECTION, VISION, MOTION, VELOCITY, TARGETS, MOVING TARGETS, PRECISION, HUMANS, OBSERVERS, PERFORMANCE(HUMAN), OPTIMIZATION, FREQUENCY, SPATIAL DISTRIBUTION, RATES, STROBOSCOPES, SIGNALS, TIME

BATTELLE COLUMBUS LABS OH

(U) Laser Produced X-Ray for High Resolution Lithography.

DESCRIPTIVE NOTE: Annual rept. 15 Dec 83-14 Dec 84.

IDENTIFIERS: (U) Velocity discrimination, Acceleration detection, Motion detection, Apparent motion, WUAFOSR2313AS, PE61102F

APR 85 42P

PERSONAL AUTHORS: Epstein, M. M. ;

CONTRACT NO. AFOSR-82-0066

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-85-0501

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past year the research effort was concentrated on the rapidly pulsed laser-plasma x-ray source. The effort was divided into three areas: developing the source and system, studying improved diagnostic, and making accurate x-ray measurements over a parameter matrix.

DESCRIPTORS: (U) *LITHOGRAPHY, HIGH RESOLUTION, LASERS, MEASUREMENT, PLASMAS(PHYSICS), SOURCES, X RAYS, PULSED LASERS

IDENTIFIERS: (U) X ray sources, WUAFOSR2301A8, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 732 CONTINUED

WASHINGTON UNIV ST LOUIS MO BEHAVIOR RESEARCH LAB

potentials, Eye blink, Short term memory, PE61102F,
WJAFOSR2313A4

(U) A Psychophysiological Mapping of Cognitive Processes.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Mar 84-28 Feb 85,

APR 85 49P

PERSONAL AUTHORS: Goldstein,R. ;Stern,J. ;Bauer,L. ;

REPORT NO. 0059-85-1

CONTRACT NO. F49620-83-C-0059

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0664

UNCLASSIFIED REPORT

ABSTRACT: (U) The experiment was concerned with the effects of varied cognitive and perceptual (i.e., monitoring) demands on patterns of physiological responding. Cognitive demands were varied by manipulating the number of letters (1, 3, or 5) comprising a briefly-presented set which the subject was instructed to encode, rehearse, and, 5 sec later, compare to a single test letter. Perceptual demands were varied by presenting the subject with a cue stimulus 5 sec prior to the set, informing him of the number of letters contained therein. Several physiological measures were recorded, including HR, EOG and 'probe' evoked potentials sampled from the intervals preceding and following the letter set, and 'task' evoked potentials and blinks elicited by the cue, letter set, and test stimuli. Performance data, i.e., RT and error rates, were also recorded.

DESCRIPTORS: (U) *PSYCHOPHYSIOLOGY, *COGNITION, *MEMORY(PSYCHOLOGY), VISUAL PERCEPTION, CUES(STIMULI), PERCEPTION(PSYCHOLOGY), REACTION TIME, REFLEXES, PATTERN RECOGNITION, EYE, BRAIN, HEART RATE, MONITORING, AMPLITUDE, PERFORMANCE(HUMAN), ELECTROOCULOGRAPHY, ELECTROENCEPHALOGRAPHY

IDENTIFIERS: (U) ERP(Event Related Potentials), Evoked

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) Joint Services Electronics Program.

DESCRIPTIVE NOTE: Annual rept. 1 May 84-28 Feb 85.

APR 85 11P

PERSONAL AUTHORS: Oldham, W. G. ;

REPORT NO. UCB/ERL-85-1

CONTRACT NO. F49620-84-C-0057

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR
TR-85-0869

UNCLASSIFIED REPORT

ABSTRACT: (U) An annual report of the JSEP (Joint Services Electronics Program) in Electromagnetics, Solid State Electronics, Materials and Devices, Quantum Electronics and Information Sciences is presented. In addition, results of the research to date are summarized and significant accomplishments are indicated. Keywords include: Electromagnetics, Solid state electronics, Materials and devices, Quantum electronics, Information and control systems, and Circuits.

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A9

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PHYSICAL DYNAMICS INC BELLEVUE WA

(U) Studies of Gravity Wave Propagation in the Middle Atmosphere.

DESCRIPTIVE NOTE: Annual rept. 11 Feb 84-11 Feb 85.

MAR 85 24P

PERSONAL AUTHORS: Dunkerton, T. J. ;

REPORT NO. PD-NM-85-330R

CONTRACT NO. F49620-83-C-0081

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-85-0505

UNCLASSIFIED REPORT

ABSTRACT: (U) Research represents an effort to understand the role of gravity waves in the general circulation of the atmosphere. Such waves exist on a wide range of scales and frequencies. In this report, we describe ray tracing of gravity waves of horizontal scales from 50 to 800 km, all of which are observed in the middle atmosphere and play an essential role in the transport of momentum and mixing of constituents. Also presented are numerical simulations of gravity wave, mean-flow interaction, focusing on two aspects of this process: saturation and self-acceleration. Model results are compared to the predictions of a semi-analytic model of gravity waves. Finally, the report concludes with a discussion of constituent mixing in gravity wave breakdown, and problems in this area meriting further study.

DESCRIPTORS: (U) *GRAVITY WAVES, MIXING, MESOSPHERE, RAY TRACING, RANGE(EXTREMES), SCALE, CIRCULATION, HORIZONTAL ORIENTATION, NUMERICAL ANALYSIS, MOMENTUM, TRANSPORT

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1

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ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) P300 and Memory: Individual Differences in the von Restorff Effect.

84 42P

DESCRIPTORS: (U) *COGNITION, *MEMORY(PSYCHOLOGY) PSYCHOPHYSIOLOGY, PERCEPTION(PSYCHOLOGY), BRAIN, RESPONSE, AMPLITUDE, ELECTROENCEPHALOGRAPHY, RECALL, REPRINTS

IDENTIFIERS: (U) ERP(Event Related Potentials), P300, von Restorff effect, Individual differences, PE61102F, WUAFOSR2313A4

PERSONAL AUTHORS: Karis,D. ;Fabiani,M. ;Donchin,E. ;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0813

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Cognitive Psychology, v16
p177-216, 1984.

ABSTRACT: (U) Event-related brain potentials (ERPs) were elicited by words in a free recall paradigm that included a novel item. The P300 component of the ERP is elicited by novel, task-relevant events, and we tested the hypothesis that P300 is manifestation of the cognitive processing invoked during context updating. If the degree to which current representations in working memory need revision is related to P300 amplitude, then the P300 elicited by a given item should be related to the ability to recall that item on a subsequent test. Forty lists were presented to 12 subjects in each of two sessions. The lists were 15 words long, and 1 word, in position 8 through 10, was isolated by changing its size. Most subjects recalled these isolated words more often than other words in the same positions (von Restorff effect), and these words also elicited larger P300s than other words. Analysis of variance on the component scores from a principal components analysis revealed that words recalled had a large amplitude P300 (on initial presentation) than words not recalled. Striking individual differences emerged, and there were strong relationships between the von Restorff effect, overall recall performance, mnemonic strategies, and the association between components of the ERP and recall performance.

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CARNEGIE INST OF TECH PITTSBURGH PA GRADUATE SCHOOL OF
INDUSTRIAL ADMINISTRATION

SYNTHESIS, TIME DOMAIN, JOBS, SCHEDULING

(U) The Use of Multiple Problem Decompositions in Time
Constrained Planning Tasks.

IDENTIFIERS: (U) Multiple problem decompositions.
PE61102F, WUAFOSR2304A7

MAY 85 10P

PERSONAL AUTHORS: Smith, S. F. ; Peng, S. O. ;

CONTRACT NO. F49620-82-K-0017

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-85-0637

UNCLASSIFIED REPORT

ABSTRACT: (U) Problems requiring the synthesis of a collection of plans accomplishing distinct (but possibly related) goals has received increasing attention within artificial intelligence. Such problems are typically formulated as multi-agent planning problems, emphasizing a problem decomposition wherein individual agents assume responsibility for the generation of individual plans while taking into account the goals and beliefs of other agents in the system. One consequence of such a problem decomposition is a simplified view of resource allocations that assumes avoidance of conflicts to be the sole concern. The validity of this assumption comes into question in time constrained problem domains requiring the allocation of multiple, shared resources. In job shop scheduling for example, where sequences of manufacturing operations must be determined and scheduled for multiple orders, it is necessary to consider much more than availability to efficiently allocate resources over time. This document argues that in such domains, an ability to reason from both resource-based and agent-based perspectives is essential to appropriate consideration of all domain constraints.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *PLANNING, *TIME, JOB SHOP SCHEDULING, DECOMPOSITION, RESOURCES, SHARING, COLLECTION, PROBLEM SOLVING, ALLOCATIONS, RESOURCE MANAGEMENT, MANUFACTURING, OPERATION, SEQUENCES,

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IDAHO UNIV MOSCOW

AD-A158 717 CONTINUED

*PENTANES, *FLUORINE COMPOUNDS, *NITROSO COMPOUNDS,
CYCLIC COMPOUNDS, ETHYLENE, BUTADIENES, HYDRAZINES,
ADDITION REACTIONS, REPRINTS

(U) Syntheses of Heptafluoro nitrosocyclo-butane and
Nonafluoro nitrosocyclo-pentane and Their Reactions
with Tetrafluoroethene, 1,3-Hexafluorobutadiene, and
Tetrafluorohydrazine,

IDENTIFIERS: (U) PEB1102F, WJAFOSR230382

84 8P

PERSONAL AUTHORS: Marsden, H. M. ; Shreeve, J. M. ;

CONTRACT NO. AFOSR-82-0247

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0511

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v23 n22
p3654-3659 1984.

ABSTRACT: (U) Hexafluorocyclobutene and
octafluorocyclopentene were reacted with nitrosyl chloride
or nitrogen dioxide in the presence of KF in acetonitrile
to give 80% yields of the blue
heptafluoronitrosocyclobutane (I) and
nonafluoronitrosocyclopentane (II), respectively. Thermal
decomposition of I and II in Pyrex glass resulted in the
analogous nitro compounds CF₂CF₂CF₂CFNO₂ and
CF₂CF₂CF₂CF₂CFNO₂. Cycloaddition reactions of I and II
with tetrafluoroethene gave the oxazetidines
CF₂CF₂CF₂CF₂CFNO₂CF₂ and CF₂CF₂CF₂CF₂CFNO₂CF₂ and
with 1,3-hexafluorobutadiene formed the oxazines
CF₂CF₂CF₂CF₂CFNO₂CF-CFCF double bond and
CF₂CF₂CF₂CF₂CFNO₂CF-CFCF double bond. With
tetrafluorohydrazine in metal reaction vessels, either I
and II or the cycloolefins gave difluoroamines,
CF₂CF₂CF₂CFNF₂ and CF₂CF₂CF₂CF₂CFNF₂. However, in the
presence of Pyrex glass, N-(heptafluorocyclobutyl)-N-
fluorodimide N-oxide and N-(nonafluorocyclopentyl)-N-
fluorodimide N-oxide (RfN(O)-NF double bond) resulted
from heating I and II with N₂F₄.

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *BUTANES,

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AD-A158 716 11/10 7/3

CINCINNATI UNIV OH

(U) The Effects of Various Catalysts in the In-Situ Precipitation of Reinforcing Silica in Polydimethylsiloxane Networks.

84 10P

PERSONAL AUTHORS: JIANG, C. Y. ; MARK, J. E. ;

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0515

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Makromolekulare Chemie, v185 p2609-2617 1984.

ABSTRACT: (U) A variety of inorganic and organic acids, bases, and salts were studied as catalysts for the hydrolysis of tetraethyl orthosilicate, the reaction previously employed for the precipitation of silica within already-cured elastomeric networks of polydimethylsiloxane. These substances were compared with regard to the amount of silica precipitated at room temperature, and the extent of reinforcement as judged by the upturns in the stress-strain isotherms at high elongations. On this basis, the acids were the least effective and the salts the most effective.

DESCRIPTORS: (U) *CATALYSTS, *HYDROLYSIS, *ELASTOMERS, POLYMERS, METHYL RADICALS, SILOXANES, SILICON DIOXIDE, PRECIPITATION, REPRINTS

IDENTIFIERS: (U) Siloxane/Polydimethyl, PE61102F, WUAFOSR2303A3

AD-A158 715 5/10 8/16

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) An Analysis of the Processing Requirements of a Complex Perceptual-Motor Task.

DEC 83 26P

PERSONAL AUTHORS: KRAMER, A. F. ; WICKENS, C. D. ; DONCHIN, E.

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0605

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Human Factors, v25 n6 p597-621 1983.

ABSTRACT: (U) Current concerns in the assessment of mental workload are discussed, and the event-related brain potential (ERP) is introduced as a promising mental-workload index. Subjects participated in a series of studies in which they were required to perform a target acquisition task while also covertly counting either auditory or visual probes. The effects of several task-difficulty manipulations on the P300 component of the ERP elicited by the counted stimulus probes were investigated. With sufficient practiced subjects the amplitude of the P300 was found to decrease with increases in task difficulty. The second experiment also provided evidence that the P300 is selectively sensitive to task-relevant attributes. A third experiment demonstrated a convergence in the amplitude of the P300s elicited in the simple and difficult versions of the tracking task. The amplitude of the P300 was also found to covary with the measures of tracking performance. The results of the series of three experiments illustrate the sensitivity of the P300 to the processing requirements of a complex target acquisition task.

DESCRIPTORS: (U) *PERCEPTION(PSYCHOLOGY), *INFORMATION PROCESSING, COGNITION, PSYCHOPHYSIOLOGY, BRAIN, AUDITORY

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AD-A158 713 5/10 6/16

SIGNALS, VISUAL SIGNALS, SIMULATION, AMPLITUDE, TARGET ACQUISITION, TRACKING, PERFORMANCE(HUMAN), WORKLOAD, REPRINTS

ILLINOIS UNIV CHAMPAIGN

(U) Performance of Concurrent Tasks: A Psychophysiological Analysis of the Reciprocity of Information-Processing Resources.

IDENTIFIERS: (U) ERP(Event Related Potentials), P300, PEG1102F, WUAFOSR2313A4

DESCRIPTIVE NOTE: Journal article.

SEP 83 5P

PERSONAL AUTHORS: Wickens,C. ;Kramer,A. ;Vanasse,L. ; Donchin,E. ;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-85-0591

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v221 p1080-1082, 9 Sep 83.

ABSTRACT: (U) The resources allocated to a primary and secondary task are reciprocal. Subjects performed a tracking task in which the discrete displacements of the tracking cursor could be used to elicit event-related brain potentials. As the resource demands of the tracking task were increased, potentials elicited by the task-defined events increased in amplitude, whereas those elicited by secondary task auditory stimuli decreased. (Author).

DESCRIPTORS: (U) *PSYCHOPHYSIOLOGY, *INFORMATION PROCESSING, ELECTROENCEPHALOGRAPHY, CORRELATION, BRAIN, TRACKING, PERCEPTION(PSYCHOLOGY), MEMORY(PSYCHOLOGY), REPRINTS

IDENTIFIERS: (U) ERP(Event Related Potentials), P300, PEG1102F, WUAFOSR2313A4

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AD-A158 708 5/10 6/16

CALIFORNIA UNIV SANTA BARBARA INST OF ENVIRONMENTAL
STRESS

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) Influences of Age and Gender on Human Thermoregulatory
Responses to Cold Exposures.

(U) Presidential Address, 1980: Surprise!... Surprise?

85 9P

81 22P

PERSONAL AUTHORS: Wagner, J. A.; Horvath, S. M.;

PERSONAL AUTHORS: Donchin, E.;

CONTRACT NO. AFOSR-78-3534

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2312

PROJECT NO. 2313

TASK NO. A1

TASK NO. A4

MONITOR: AFOSR
TR-85-0592

MONITOR: AFOSR
TR-85-0614

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Physiology,
v58 n1 p180-186 1985.

SUPPLEMENTARY NOTE: Pub. in Psychophysiology, v18 n5 p493-
513 1981.

ABSTRACT: (U) To delineate age- and gender-related differences in physiological responses to cold exposure, men and women between the ages of 20 and 29 yr and 51 and 72 yr, wearing minimal clothing, were exposed at rest for 2 h to 28, 20, 15, and 10 C room temperatures with 40% relative humidity. The data suggest that older men are more susceptible to cold ambients than younger people, since they did not prevent a further decline in their initially relatively low rectal temperature. Despite greater insulation from body fat, the older women maintained a constant rectal temperature at greater metabolic cost than men or younger women.

DESCRIPTORS: (U) *BODY TEMPERATURE, *TEMPERATURE CONTROL, *LOW TEMPERATURE, PHYSIOLOGICAL EFFECTS, HUMAN BODY, MALES, FEMALES, COMPARISON, METABOLISM, RATES, REPRINTS

IDENTIFIERS: (U) Age factor, PE61102F, WUAFOSR2312A1

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PERFORMANCE(HUMAN), SIMULATION, BEHAVIOR,
ELECTROENCEPHALOGRAPHY, AMPLITUDE, PREDICTIONS, REPRINTS

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

IDENTIFIERS: (U) ERP(Event Related Potentials), P300,
Orienting reflex, PE61102F, WUAFOSR2313A4

(U) Fuels Combustion Research.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 82-28 Feb 83,

NOV 83 144P

PERSONAL AUTHORS: Dryer, F. L. ; Glassman, I. ; Williams, F. A.

REPORT NO. MAE-1640

CONTRACT NO. F49620-82-K-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0499

UNCLASSIFIED REPORT

ABSTRACT: (U) A qualitative mechanism of aromatic oxidation has been developed and is of significant importance for the understanding of soot processes and combustor modelling. Kinetic results on toluene and ethyl benzene have elucidated how aromatic side chains are oxidized and contribute further towards developing overall mechanisms for combustor modellers. Extensive results on fuel pyrolysis rates have been obtained. These results reveal that pyrolysis rates alone do not control sooting intensity, but also the pyrolysis reveal that pyrolysis rates alone do not control sooting intensity, but also the pyrolysis intermediates formed. A complete phenomenological model of soot formation has been developed and refined by comparison with the experimental results. This model has permitted the identification of the phenomena controlling soot formation in both premixed and diffusion flame combustion systems and has great immediate practical applications. In particular, lengthy experimentation has shown that the combustion temperature is one of the most significant parameters in determining sooting tendencies in both diffusion and premixed flame situations with temperature as a controlled parameter the real effect of fuel type can be determined. A reliable

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generator of well characterized suspensions of boron slurries has been designed and constructed. Two significant new findings with respect to the ignition combustion of boron particles have been reported. The theoretical work on turbulent combustion has treated both premixed and diffusion flames by asymptotic methods.

DESCRIPTORS: (U) *COMBUSTION, *FUELS, *SOOT, AROMATIC COMPOUNDS, BENZENE COMPOUNDS, BORON, COMPARISON, CONTROL, DIFFUSION, ETHYL RADICALS, FLAMES, GENERATORS, IGNITION, MIXING, MODELS, OXIDATION, PARAMETERS, PARTICLES, PYROLYSIS, RELIABILITY, THEORY, TOLUENES, TURBULENCE, BURNING RATE, SLURRY FUELS, ASYMPTOTIC NORMALITY, COMBUSTORS, KINETICS, BORON OXIDES, DENSITY

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

AD-A158 689 12/1

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) Computational Complexity of Coherent Systems and the Reliability Polynomial.

DESCRIPTIVE NOTE: Technical rept..

JUL 85 17P

PERSONAL AUTHORS: Barlow, R. E. ; Iyer, S. ;

REPORT NO. ORC-85-6

CONTRACT NO. N00014-85-K-0384, AFOSR-81-0122

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0796

UNCLASSIFIED REPORT

ABSTRACT: (U) There are three general methods for system reliability evaluation, namely: 1) Inclusion-Exclusion, 2) Sum of Disjoint Products, and 3) Pivoting. Of these, only pivoting can be applied directly to a logic tree or network graph representation without first finding minimal path (or cut) sets. Domination theory provides the basis for selecting optimal pivoting strategies. Simple proofs of domination theory results for coherent systems are given, based on the reliability polynomial. These results are related to the problem of finding efficient strategies for computing coherent system reliability. The original results for undirected networks are due to Satyanarayana and Chang (1983). Many of the original set theoretic results are due to Huseby (1984). However, he does not use the reliability polynomial to prove his results. Additional keywords: Operation's research. (Author)

DESCRIPTORS: (U) *SYSTEMS ANALYSIS, *NUMERICAL ANALYSIS, COHERENCE, RELIABILITY, COMPUTATIONS, GRAPHS, NETWORKS, POLYNOMIALS, MATHEMATICAL LOGIC, TREES, OPERATIONS RESEARCH

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 688 12/1

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) Random Search for a Probable Object.

DESCRIPTIVE NOTE: Technical rept..

JUN 85 21P

PERSONAL AUTHORS: Jewell, W. S. ;

REPORT NO. ORC-85-5

CONTRACT NO. AFOSR-81-0122

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0802

UNCLASSIFIED REPORT

ABSTRACT: (U) A search is undertaken for an object thought to be present with an unknown probability, using a detection scheme whose efficiency is also uncertain. After a certain interval, the search is called off, with the object unfound; what are the posterior-to-experiment estimates of presence and detection efficiency? It is shown that those two unknown quantities interact in an interesting manner as the unsuccessful search goes on. Additional keywords: Bayesian estimation; mathematical models; Charts. (Author)

DESCRIPTORS: (U) *SEARCHING, BAYES THEOREM, ESTIMATES, DETECTION, PROBABILITY, EFFICIENCY, MATHEMATICAL MODELS

IDENTIFIERS: (U) *Random searching, PEG1102F

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AD-A158 678 5/10

NORTHWESTERN UNIV EVANSTON IL

(U) A Specific and Enduring Improvement in Visual Motion Discrimination.

NOV 82 4P

PERSONAL AUTHORS: Ball, K. ; Sekuler, R. ;

CONTRACT NO. AFOSR-80-0246

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-85-0604

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v218 p697-698, 12 Nov 82.

ABSTRACT: (U) Training improves the ability of human observers to discriminate between two similar directions of motions. This gradual improvement is specific to the direction on which an observer is trained, and it endures for several months. Improvement does not affect motion perception generally, nor does it depend on recognition of details of the movement.

DESCRIPTORS: (U) *VISION, *MOTION, *DISCRIMINATION, OBSERVATION, OBSERVERS, RECOGNITION, ORIENTATION(DIRECTION), REPRINTS

IDENTIFIERS: (U) Visual motion, WUAFOSR2312A3, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 671 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Formation of a Disiloxirane in the Oxidation of 1,2-Dimesityl-1,2-di-t-Butyldisilaethylene,

84 3P

PERSONAL AUTHORS: Michalczyk, M. J. ; West, R. ; Michl, J. ;

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0573

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Chemical Communications, p1525-1526 1984.

ABSTRACT: (U) Reaction of trans-1, 2 -di-t-butyl-1,2-dimesityldisilaethylene in solution with dioxygen at -78 C produces the disiloxirane and a compound believed to be the 1,2-disiladioxetane; the latter compound rearranges quantitatively to the known 1,3-cyclo-disiloxane above 0 C. (Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *SILICON COMPOUNDS, *ORGANIC COMPOUNDS, *OXIDATION REDUCTION REACTIONS, OLEFIN POLYMERS, CHEMICAL BONDS, OXETANES, REPRINTS

IDENTIFIERS: (U) *Disiloxirane, Dioxetane/1,2-disila, Silaethylene(di)/1,2, Dimesityl-1,2, -di-t-butyl, Disilenes, PE61102F, WUAFOSR2303B2

AD-A158 653 3/2

STEWART OBSERVATORY TUCSON ARIZ

(U) Speckle Image Reconstruction.

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-31 Mar 85.

APR 85 33P

PERSONAL AUTHORS: Strittmatter, P. A. ; Hege, E. K. ;

CONTRACT NO. AFOSR-82-0020

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-85-0635

UNCLASSIFIED REPORT

ABSTRACT: (U) This report contains results obtained from observations using the University of Arizona 2.3 meter telescope, the Kitt Peak National Observatory 4 meter telescope and the multiple mirror telescope. Work Done included: High Resolution Imaging Potential of MMT; Earth Satellite Observations; Asteroid/Planetary Satellite Measurements; and Image Reconstruction Experiments; Scientific Accomplishments pertained to: Asteroid/Planetary Science; Red Supergiants - Limb Darkening and Extended Atmosphere; Binary Stars; Active Galactic Nuclei; and QSO Images. (Author)

DESCRIPTORS: (U) *IMAGE PROCESSING, *STARS, STELLAR ATMOSPHERES, TELESCOPES, ARIZONA, SPECULAR REFLECTION, ATMOSPHERES, PLANETOLOGY, ASTEROIDS, IMAGES, BINARY STARS, NUCLEI, GALAXIES

IDENTIFIERS: (U) Image reconstruction, Red giants, PE61102F, WUAFOSR2311A1

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YALE UNIV NEW HAVEN CT DEPT OF CHEMICAL ENGINEERING

(U) Interfacial Chemical Reactions and Transport Phenomena
in Flow Systems.

DESCRIPTIVE NOTE: Final rept. 1 Dec 81-30 Nov 83.

JAN 84 21P

PERSONAL AUTHORS: Rosner, D. E. ;

CONTRACT NO. F49620-82-K-0020

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0492

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes Yale-High Temperature Chemical Reaction Engineering Laboratory methods/results for the two-year period ending 11/30/83. Note-worthy findings on interfacial chemical reactions and mass transport include: (1) thermal (Soret) mass transfer can systematically enhance H₂-transport rates to catalytic combustion surfaces by up to 20% in forced convection systems; (2) For submicron particle transport (MgO) to cold surfaces in hot combustion gases thermophoresis causes about a 2000-fold increase in the deposition rate (over that expected from convective-Brownian diffusion); (3) By accounting for the suction and apparent-source effects associated with thermophoresis within particle laden nonisothermal boundary layers (BLs) simple rational engineering correlations have been proposed and verified via numerical laminar and turbulent BL-boundary calculations; (4) Quantitative, rapid-response measurements of solid gasification kinetics have now been made using an adaptation of microwave-induced-plasma emission spectroscopy. This technique, shown to follow Pt-atom fluxes down to ca. 2 to 10 to the 13th power atm/sq cm/s, appears to be promising for studying the oxidation kinetics of boron. Originator supplied keywords include: Aerosols, Convective diffusion, Combustion, Deposition, Energy transfer, Fouling, Heterogeneous Catalysis, Flow

reactors, Inertial impaction, Optical methods, Soot, Thermal diffusion, Thermophoresis and turbine blades.

DESCRIPTORS: (U) *COMBUSTION, *HYDROGEN, *CHEMICAL REACTIONS, *MASS TRANSFER, AEROSOLS, CATALYSTS, SURFACES, DEPOSITION, ENERGY TRANSFER, CONVECTION, BOUNDARY LAYER, LOW TEMPERATURE, DIFFUSION, RATES, FLOW, FOULING, TRANSPORT PROPERTIES, HETEROGENEITY, INTERFACES, PARTICLES, SOOT, THERMAL DIFFUSION, TURBINE BLADES, HOT GASES, BORON, KINETICS, OXIDATION, ENERGY CONVERSION, GASES, KINETICS, SOLIDS, TRANSPORT

IDENTIFIERS: (U) Thermophoresis, PE61102F, WUAFWAL2308A2

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SEARCH CONTROL NO. EVK15N

AD-A158 644 12/1

AD-A158 643 12/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Information in Censored Models.

DESCRIPTIVE NOTE: Technical rept..

(U) Varying Boundary Conditions with Large Diffusivity.

JUN 85 25P

MAR 85 42P

PERSONAL AUTHORS: Hollander, M.; Proschan, F.; Sconing, J.;

PERSONAL AUTHORS: Hale, J. K.; Rocha, C.;

REPORT NO. FSU-STATISTICS-M701, TR-85-177-AFOSR

REPORT NO. LCDS-85-5

CONTRACT NO. F49620-85-C-0007

CONTRACT NO. DAAG29-83-K-0029, AFOSR-84-0376

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0527

TR-85-0617

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Criteria are developed for measuring information in the randomly right-censored model. Measures which are appropriate include an extension of Shannon's entropy. The measures are seen to satisfy some fundamental theorems including (i) the uncensored case is always at least as informative as any censored model, (ii) information decreases as censoring increases stochastically, and (iii) the information gain is marginally decreasing. Additional keywords: random variables; statistical inference.

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-DMS82-05355.

ABSTRACT: (U) For systems of semilinear parabolic partial differential equations on bounded domains with large diffusivity and homogeneous boundary conditions close to the Neumann conditions, the authors associate a system of ordinary differential equations (ode's) from which the dynamics of the original system can be inferred. Small perturbations of the Neumann case produce large perturbations in the ode's with corresponding effects on the dynamics of the system. The same theory is valid for functional differential equations. Applications are considered in models for control by genetic repression of biological material in cells. (Author)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *INFORMATION THEORY, ENTROPY, MEASUREMENT, GAIN, RANDOM VARIABLES, CENSORSHIP, STOCHASTIC PROCESSES

IDENTIFIERS: (U) Shannons' Entropy, PEG1102F, WUAFOSR2304A5

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, BIOLOGY, BOUNDARIES, DIFFERENTIAL EQUATIONS, DIFFUSIVITY, DOMAIN WALLS, DYNAMICS, HOMOGENEITY, PARABOLAS, PERTURBATIONS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A1

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AD-A158 641 12/1

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MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION
AND DECISION SYSTEMS

DESCRIPTORS: (U) *INVERSION, *SEISMIC WAVES, DENSITY,
MEASUREMENT, SIZES(DIMENSIONS), SPATIAL DISTRIBUTION,
SURFACES, TWO DIMENSIONAL, VARIABLES, VELOCITY, WAVES,
PROBLEM SOLVING

(U) Notes on Layer Stripping Solutions of Higher
Dimensional Inverse Seismic Problems.

IDENTIFIERS: (U) PES1102F, WUAFOSR2304A1

DEC 83 18P

PERSONAL AUTHORS: Yagle, A. E. ;

REPORT NO. LIDS-P-1347

CONTRACT NO. AFOSR-82-0135

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0628

UNCLASSIFIED REPORT

ABSTRACT: (U) The subject of this paper is the inverse seismic problem in dimensions higher than one, in which local density and wave speed are function of more than one spatial variable. To clarify matters, some terminology is introduced. The dimension of and inverse problem is defined as the number of spatial variables on which the quantities of interest (ρ and c) depend. Thus, the two-dimensional problem is the inverse problem of determining $\rho(x,z)$ and $c(x,z)$ from surface measurements of the displacement $u(x, y, z=0, t)$, and the three-dimensional problem is the inverse problem of determining $\rho(x,y,z)$ and $c(x,y,z)$ from surface measurements of the displacement $u(x,y,z=0,t)$. Note that the dimension of a problem need not be the same as the dimension of the medium for which it is defined--a problem of given dimension of the medium for which it is defined -- a problem of given dimension can be embedded in a medium of higher dimension. For example, the offset problem described in a previous work is a 1-D problem embedded in a 2-D medium, while the point-source problem of that same paper is a 1-D problem embedded in a 3-D medium. While a considerable amount of work has been done on the 1-D problem, much less has been done on the 2-D and 3-D problems.

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MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL INTELLIGENCE LAB

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Computations Underlying the Measurement of Visual Motion.

(U) Synthesis, Structure and Reactivity of Molecules Attached to Electrode Surfaces.

84 47P

DESCRIPTIVE NOTE: Final rept. 15 Apr 81-15 Apr 85.

PERSONAL AUTHORS: Hildreth, E. C. ;

JUL 85 43P

CONTRACT NO. F49620-83-C-0135

PERSONAL AUTHORS: Hubbard, A. T. ;

PROJECT NO. 2313

CONTRACT NO. AFOSR-81-0149

TASK NO. A5

PROJECT NO. 2303

MONITOR: AFOSR TR-85-0585

TASK NO. A1

MONITOR: AFOSR TR-85-0627

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Artificial Intelligence, v23 p309-354 1984.

ABSTRACT: (U) This paper presents a method for computing the velocity field, with three main components. First, initial measurements of motion in the image take place at the location of significant intensity changes, which give rise to zero-crossings in the output of the convolution of the image with a DEL square G operator. The initial motion measurements provide the component of velocity in the direction perpendicular to the local orientation of the zero-crossing contours. Second, these initial measurements are integrated along contours to compute the two-dimensional velocity field. Third, an additional constraint of smoothness of the velocity field, based on the physical constraint that surfaces are generally smooth, allows the computation of a unique velocity field. The details of an algorithm are presented, with results of the algorithm applied to artificial and natural image sequences.

DESCRIPTORS: (U) *MOTION, *VISION, ORIENTATION(DIRECTION) *MEASUREMENT, COMPUTATIONS, IMAGES, EQUATIONS, THEORY, ALGORITHMS, REPRINTS

IDENTIFIERS: (U) *Visual motion, WUAFOSR2313A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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DESCRIPTORS: (U) *MOLECULES, *FLUIDS, *METALS, *SURFACES, ADSORPTION, ELECTRODES, RATES, ELECTRODEPOSITION, CIRCUITS, ELECTRONICS, BONDING, HYDROGEN ELECTROCHEMISTRY, ELECTROLYTES, VARIABLES, OCEAN ENVIRONMENTS, ATTACHMENT, ADSORBATES, ORIENTATION(DIRECTION), STRUCTURAL PROPERTIES, ULTRAHIGH VACUUM, SURFACES, ORGANIC COMPOUNDS, PREPARATION, SUBSTRATES, SYNTHESIS, FUEL CELLS

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Combustion Behavior of Free Boron Slurry Droplets.

MAY 85 27P

PERSONAL AUTHORS: Takahashi, F. ; Dryer, F. L. ; Williams, F. A. ;

IDENTIFIERS: (U) WJAFOSR2303A1, PEG1102F

REPORT NO. MAE-1702

CONTRACT NO. F49620-82-K-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0559

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper reports first observations of the combustion properties of isolated boron/JP-10 slurry droplets in high temperature, atmospheric pressure oxidizing streams under low Reynolds number conditions. Slurry droplets of initial diameter between 400 and 500 micrometers and initial solid mass fraction of 0.3 were studied using single-lens reflex and high speed cine photography under both self illuminated and backlighted conditions. Boron slurry droplets burned for short periods of time with an envelope diffusion flame structure, but then experienced violent disruption for all cases studied. The intensity of the disruption progress was found to be strongly influenced by the temperature of the envelope diffusion flame. The ignition of the boron particles emitted from the initial fuel droplet was also affected by this flame temperature. As this flame temperature was increased by increasing the environmental oxygen content, the disruption occurred at earlier times in the vapor phase burning period. Ignition of the boron particles at high flame temperatures (> 2500K) was accompanied by a popping sound and a bright greenish flash of luminosity.

DESCRIPTORS: (U) *BORON, *COMBUSTION, *JET ENGINE FUELS, *SLURRY FUELS, BAROMETRIC PRESSURE, OXIDATION, STREAMS,

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DROPS, SLURRIES, DIFFUSION, ENVELOPE(SPACE), FLAMES, STRUCTURAL PROPERTIES, FLASHES, LUMINOSITY, PARTICLES, TEMPERATURE, FUELS, HIGH VELOCITY, IGNITION, INTENSITY, OBSERVATION, SHORT RANGE(TIME), HIGH TEMPERATURE, ILLUMINATION, LOW RATE, REYNOLDS NUMBER, PHOTOGRAPHY

GEORGIA INST OF TECH ATLANTA

(U) Extreme Values of Queues, Point Processes and Stochastic Networks.

DESCRIPTIVE NOTE: Research progress rept. 30 Sep 84-15 Jun 85,

IDENTIFIERS: (U) WJAFOSR2308A2, PE61102F

JUN 85 5P

PERSONAL AUTHORS: Serfozo, R. F. ;

CONTRACT NO. AFOSR-84-0387

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0620

UNCLASSIFIED REPORT

ABSTRACT: (U) This document reports on research progress in the following topics: (1) Extreme Values of Queues - Several subtle technical problems remain to present the results in as general and natural setting as possible; (2) Extreme Values of Stochastic Networks - Work should be completed by fall. After that the emphasis will change on this topic to the following one; (3) Optimal Control of Networks of queues - This topic was not in the original proposal, but the investigators have made a breakthrough in this area that they intend to pursue; (4) Point Processes Related to Extreme Values - Several results in the convergence of certain point processes to Poisson processes have been obtained. These are documented in two papers written under this grant; and (5) Extreme Values of Point Processes - This is an area which will be developed later in the research effort. (Author)

DESCRIPTORS: (U) *QUEUEING THEORY, *STOCHASTIC PROCESSES, CONTROL, NETWORKS, RANGE(EXTREMES), OPTIMIZATION, POISSON DENSITY FUNCTIONS, VALUE, POINTS(MATHEMATICS), RANGE(EXTREMES)

IDENTIFIERS: (U) Stochastic networks, WJAFOSR2304A5, PE61102F

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MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL
INTELLIGENCE LAB PE61102F

(U) The Computation of the Velocity Field.

84 35P

PERSONAL AUTHORS: Hildreth, E. C. ;

CONTRACT NO. F49620-83-C-0135

MONITOR: AFOSR
TR-85-0587

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Royal
Society of London, v8221 p189-220 1984.

ABSTRACT: (U) The organization of movement in the
changing retinal image provides a valuable source of
information for analysing the environment in terms of
objects, their motion in space, and their three-
dimensional structure. A description of this movement is
not provided to our visual system directly, however; it
must be inferred from the pattern of changing intensity
that reaches the eye. This paper examines the problem of
motion measurement, which we formulate as the computation
of an instantaneous two-dimensional velocity field from
the changing image. Initial measurements of motion take
place at their location of significant intensity changes.
These measurements provide only one component of local
velocity, and must be integrated to compute the two-
dimensional velocity field. A fundamental problem for
this integration stage is that the velocity field is not
determined uniquely from information available in the
changing image. We formulate and additional constraint of
smoothness of the velocity field, based on the physical
assumption that surfaces are generally smooth, which
allows the computation of a unique velocity field.

DESCRIPTORS: (U) *IMAGE PROCESSING, *VISUAL PERCEPTION,
*SPACE PERCEPTION, VISION, TARGETS, MOTION, RETINA,
VELOCITY, THREE DIMENSIONAL, TWO DIMENSIONAL, INFORMATION
PROCESSING, COMPREHENSION, COMPUTATIONS, MATHEMATICAL
MODELS, REPRINTS

IDENTIFIERS: (U) Motion analysis, WUAFOSR2313A5.

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ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

IDENTIFIERS: (U) ERP(Event Related Potentials), P300,
PE61102F, MUAF05R2313A4

(U) On the Dependence of P300 Latency on Stimulus
Evaluation Processes.

MAR 84

18P

PERSONAL AUTHORS: Magliero, A.; Bashore, T. R.; Coles, M. G.
H.; Donchin, E.;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0612

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Psychophysiology, v21 n2 p171-
186 Mar 84.

ABSTRACT: (U) McCarthy and Donchin (1981) found that the latency of a late positive component of the event-related potential (ERP) was influenced by the presence of noise in a stimulus matrix but not by the compatibility between the stimulus presented and the response required. They concluded that this component is a P300 and that its latency was influenced by stimulus evaluation but not by response selection processes. The present experiments were designed to confirm that the component identified by McCarthy and Donchin was indeed a P300 and to determine if its latency varies systematically with increases in stimulus evaluation time produced by graded changes in noise level. In Experiment 1, subjects performed a standard oddball task in which they were required to count the rarer of two stimuli (the words RIGHT or LEFT) which were, or were not, embedded in a noise matrix (characters from the alphabet).

DESCRIPTORS: (U) *REACTION(PSYCHOLOGY), WORD RECOGNITION, CUES(STIMULI), PSYCHOPHYSIOLOGY, RESPONSE, SELECTION, REACTION TIME, NOISE, AMPLITUDE, VISUAL PERCEPTION, BRAIN, ELECTROENCEPHALOGRAPHY, VISUAL SIGNALS, PERFORMANCE(HUMAN), REPRINTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

MICHIGAN UNIV ANN ARBOR DEPT OF PHYSICS

(U) A Variant of Shanbhag's Lemma Arising out of a Modified Rao-Rubbin Condition.

(U) The Detection of Faint Space Object with Solid State Image Detectors.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 80-31 Jan 85.

MAY 85 15P

MAR 85 17P

PERSONAL AUTHORS: Alzaid, A. A. ; Rao, C. R. ; Shanbhag, D. N.

PERSONAL AUTHORS: Hegyi, D. J. ;

REPORT NO. TR-85-22

CONTRACT NO. AFOSR-80-0095

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2311

TASK NO. 2304

TASK NO. A1

TASK NO. A5

MONITOR: AFOSR
TR-85-0389

MONITOR: AFOSR
TR-85-0558

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A modified Rao-Rubbin condition for damage models gives rise to a recurrence relation which is somewhat different from that considered by Shanbhag (1977). A complete solution to the new recurrence relation is obtained and its applications are indicated. Additional keywords: Random variables; Integrated Cauchy functional equation. (Author)

DESCRIPTORS: (U) *CAUCHY PROBLEM, DAMAGE, RANDOM VARIABLES, EQUATIONS, FUNCTIONAL ANALYSIS, MATHEMATICAL MODELS, MODIFICATION, NUMERICAL INTEGRATION

IDENTIFIERS: (U) *Shanbhags Lemma, Rao Rubbin condition, PEG1102F, WUAFOSR2304A5

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ABSTRACT: (U) The primary focus of research during this funding period has been to obtain information with the highest signal-to-noise ratio from faint astronomical sources using a charge-coupled device (CCD). The starting point of the investigation was to determine the optimal sampling function for CCDs considering the noise spectrum characteristics of real devices; the noise spectrum of most CCDs can be accurately described by a combination of $1/f$ and white noise. Then, a CCD system was constructed so that all operating parameters could be easily adjusted. Some unexpected improvements in performance were obtained by optimizing the operating temperature and increasing the number of electrode voltages which could be independently set compared to other CCD systems. The next phase of the investigation was to develop an image processing system to extract, in a statistically correct way, as much information as possible from astronomical images. The system was then applied to problems ranging from speckle interferometry to global cosmological tests including an investigation to determine the nature of the dark matter in the halos of spiral galaxies.

DESCRIPTORS: (U) *SPACE OBJECTS, *ASTRONOMY, *SOLID STATE ELECTRONICS, IMAGES, DETECTION, LOW INTENSITY.

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IMAGE PROCESSING, NOISE, SPECTRA, FUNCTIONS, OPTIMIZATION, SAMPLING, CHARGE COUPLED DEVICES, SOURCES, SIGNAL TO NOISE RATIO, ELECTRODES, VOLTAGE, DETECTORS, IMAGE TUBES, INTERFEROMETRY, WHITE NOISE, GALAXIES

CONNECTICUT UNIV STORRS DEPT OF METALLURGY

(U) The Fatigue of Powder Metallurgy Alloys.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2311A1

DESCRIPTIVE NOTE: Final scientific rept. 1 Dec 80-30 Nov 84.

MAR 85 61P

PERSONAL AUTHORS: McEVILLY, A. J. ;

CONTRACT NO. AFOSR-81-0046

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-85-0489

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the important conditions in qualifying high strength powder metallurgy alloys is their resistance to fatigue crack propagation. The results of the present investigation indicate that the fatigue crack propagation resistance of high strength P/M aluminum alloys is equivalent to that of a comparable ingot metallurgy alloy in the near-threshold region. The ingot alloy exhibits a slightly lower crack growth rate in the intermediate region. However the higher strength of the P/M alloys (550 MPa YS, 600 MPa UTS) as compared to the ingot alloy (450 MPa YS, 550 MPa UTS) results in a reduction of fracture toughness with the result that the crack growth rates at high (ΔK) levels are higher in the P/M alloys. If exactly equivalent tensile properties were present in both P/M and I/M materials perhaps this difference would not occur since nothing characterizable as a defect was found in the P/M alloys. A procedure for the analysis of the growth of short cracks from notches based upon crack closure considerations has also been formulated. Short crack behavior is important in establishing inspection intervals in retirement for cause applications, for example. The rate and extent at which crack closure develops in the wake of a newly formed crack can be used not only in the treatment of short crack behavior, but also to account for the notch size effect in fatigue as well as for fatigue notch

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sensitivity.

DESCRIPTORS: (U) *CRACK PROPAGATION, *POWDER ALLOYS, CRACKS, FATIGUE(MECHANICS), INSPECTION, FRACTURE(MECHANICS), TOUGHNESS, TENSILE PROPERTIES, NOTCH SENSITIVITY, OVERLOAD, ALUMINUM, ALLOYS

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF COMPUTER SCIENCE

(U) Programming Productivity Enhancement by the use of Application Generators by the Use of Application Generators.

IDENTIFIERS: (U) Fatigue crack propagation, Short Cracks, Crack Closure, PE61102F, WUAFOSR2306A1

DESCRIPTIVE NOTE: Research progress rept. 10 Jan-31 May 85.

JUN 85 15P

PERSONAL AUTHORS: Horowitz, E. ;

CONTRACT NO. AFOSR-82-0232

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0618

UNCLASSIFIED REPORT

ABSTRACT: (U) The first chapter deals with the specific research areas that were investigated and discuss the accomplishments for each. The areas of research are: Application Generators; Office Information Systems; Software Engineering; and the Script Writer Software Development Environment. The next chapter reviews the progress of all people who have been supported under the grant. Additional keywords: Add programming language; and Computer applications. (Author)

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *PROGRAMMING LANGUAGES, COMPUTER APPLICATIONS, COMPUTER PROGRAMS, GENERATORS, INFORMATION SYSTEMS, PRODUCTIVITY, SYSTEMS ENGINEERING, computer applications, computer programming, computer programs, generators, information systems, productivity, programming language, systems engineering

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

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FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

PARAMETRIC ANALYSIS, PERSONNEL, STATISTICS

(U) Mean Residual Life: Theory and Applications.

IDENTIFIERS: (U) Residual Life, MRL (Mean Residual Life),
PE61102F, WUAFOSR2304AS

DESCRIPTIVE NOTE: Interim rept..

JUN 85 21P

PERSONAL AUTHORS: Guess, F. ; Proschan, F. ;

REPORT NO. FSU-STATISTICS-M702

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR AFOSR
TR-85-0630, TR-85-178

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ABSTRACT: (U) In the last two decades, reliability statisticians, and others have shown intensified interest in the mean residual life (MRL) and derived many useful results concerning it. Given that a unit is of age t , the remaining life after time t is random. The expected value of this random residual life is called the mean residual life at time t . Since the MRL is defined for each time t , we also speak of the MRL function. The MRL function is like the density function the moment generating function, or the characteristic function; for a distribution with a finite mean, the MRL completely determines the distribution via an inversion formula. Not only is the MRL used for parametric modeling but also for nonparametric modeling. Large non-parametric classes of life distributions such as decreasing mean residual life (DMRL) and new better than used in expectation (NBUE) have been defined using MRL. This paper defines the MRL function formally and survey some of the key theory. Its wide range of applications is also discussed. Additional keywords: Reliability; Failure rate. (Author)

DESCRIPTORS: (U) *LIFE EXPECTANCY(SERVICE LIFE),
FORMULAS(MATHEMATICS), DISTRIBUTION FUNCTIONS, RESIDUALS,
NORMAL DENSITY FUNCTIONS, FORMULATIONS, INVERSION,
FUNCTIONS, MOMENTS, RELIABILITY, FAILURE, RATES, MODELS,

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ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) Tvas Ten to One; And Yet We Ventured: P300 and Decision Making.

83 13P

conditions in the overall 'riskiness' of predictions, and the strategies adopted by most subjects also resulted in differences in the salience, or task relevance, of the feedback stimuli. These differences resulted in an overall increase in P300 in all-or-none condition. A relationship also emerged between the subjects' strategies and their event related potential. Keywords: reprints. (Author)

PERSONAL AUTHORS: Karls, D. ; Chesney, G. L. ; Donchin, E. ;

CONTRACT NO. N00014-76-C-0002, F49620-79-C-0233

DESCRIPTORS: (U) *DECISION MAKING, *PROBABILITY, STIMULI, REPRINTS, FEEDBACK, PREDICTIONS, BEHAVIORAL SCIENCE

PROJECT NO. 2313

TASK NO. A4

IDENTIFIERS: (U) Future, Tokenism, PE61102F, WUAFOSR231A4

MONITOR: AFOSR TR-85-0590

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Psychophysiology, v20 n3 p260-268 1983.

ABSTRACT: (U) In some situations subjects' predictions of future events do not accurately reflect the subjective probability associated with these events. We set up a situation by manipulating the payoff structure in a prediction paradigm, and found that P300 provides an index of the processes responsible for subjective probability, or expectancy, not obtainable from overt predictions. Sixteen subjects were required to predict, on each trial, whether a 1, 2 or 3 would appear on a display. The numbers appeared randomly with probabilities .45, .10, and .45, respectively. In one condition subjects were given bonuses according to an all-or-none payoff function in which they received one cent if they predicted correctly, and nothing if they were incorrect. In a second condition bonuses were determined by a linear payoff function in which subjects were paid one cent if they predicted correctly, and one-half cent if they were off by one (e.g. predict 1 and 2 appears). After each condition subjects estimated the actual number of stimuli presented. These estimates were the same for both conditions, although predictions differed radically. With 2 predicted much more frequently in the linear condition. P300 area was largest for the rare event (2), and the relationship between P300 and probability was unaffected by payoffs. Our design did not introduce between

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MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL INTELLIGENCE LAB

IDENTIFIERS: (U) Zero crossings, Image understanding, PE61102F, WUAFOSR2313A5

(U) Fingerprints Theorems,

AUG 84 5P

PERSONAL AUTHORS: Yuille, A. L.; Poggio, T.;

CONTRACT NO. N00014-80-C-0505, F49620-83-C-0135

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0589

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the National Conference on Artificial Intelligence, p362-365, 6-10 Aug 84.

ABSTRACT: (U) In this reprint the authors prove that the scale map of the zero-crossings of almost all signals filtered by a gaussian of variable size determines the signal uniquely up to a constant scaling. Exceptions are signals that are antisymmetric about all their zeros (for instance infinitely periodic gratings) Their proof provides a method for reconstructing almost all signals from knowledge of how the zero-crossing contours of the signal filtered by a gaussian filter, change with the size of the filter. The proof assumes that the filtered signal can be represented as a polynomial of finite, albeit possibly very high, order. The result applies to zero- and level-crossings of signals filtered by gaussian filters. The theorem is extended to two dimensions, that is to images. These results imply that extrema (for instance of derivatives) at different scales are a complete representation of a signal. Additional keywords: image understanding; edge detection. (Author)

DESCRIPTORS: (U) *SIGNAL PROCESSING, SIGNALS, DETECTION, EDGES, FINGERPRINTS, THEOREMS, POLYNOMIALS, CONSTANTS, SCALING FACTORS, FILTERS, SIGNALS, GRATINGS(SPECTRA), REPRINTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Further Informational Properties of the Nash and Stackelberg Solutions of LQG Games.

DESCRIPTORS: (U) *DECISION MAKING, *INFORMATION THEORY, GAME THEORY, KALMAN FILTERING, NUMERICAL ANALYSIS, ORTHOGONALITY, STATICS, MATRICES(MATHEMATICS)

DESCRIPTIVE NOTE: Final rept. Jun 82-May 84.

IDENTIFIERS: (U) WUAFOSR2304A8, PE61102F

MAY 85 91P

PERSONAL AUTHORS: Papavassilopoulos, G. P. ;

REPORT NO. 53-4503-1797

CONTRACT NO. AFOSR-82-0174

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0624

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers a two-decision-maker problem where each decision maker has his own information and studies the impact of improving the information of only one decision maker. In a previous document an example of a two-decision-maker LQG static Nash game was considered and was shown for that particular example that, on the one hand, if one of the decision makers improves his own information by obtaining his opponent's information (while his opponent's information does not change) then he ends up with a higher Nash cost; on the other hand, if he improves his own information by getting an extra measurement not from his opponent (while his opponent's information does not change) then he might incur lower Nash cost. This paper proves that in a general two-decision-maker LQG static or dynamic Nash game, if one of the decision makers knows all his opponent's information, then more or better information for him alone is beneficial to him. In static games the authors prove that more information for one of the decision makers alone is beneficial to him provided that such information is orthogonal to both decision maker's information. Additional keywords: Numerical analysis; Kalman filtering; Orthogonality; Matrices(Mathematics).

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CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL ENGINEERING

system. Experiments separating the effects are underway to investigate this interactive process. (Author)

(U) Multiple Ignition, Combustion and Quenching of Hydrocarbon Fuel Sprays.

DESCRIPTORS: (U) *FUEL SPRAYS. *HYDROCARBONS. *IGNITION. *COMBUSTION, CODING, COMBUSTION, CONVECTION, DELAY, DIAMETERS, DIFFUSION, DROPS, EVAPORATION, FUEL AIR RATIO, FUEL SPRAYS, FUELS, HEAT, HIGH TEMPERATURE, INTERACTIONS, MEAN, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, RANGE(DISTANCE), REACTION KINETICS, SIZES(DIMENSIONS), SPRAYS, STATISTICS, STREAMS, SURFACES, TIME, WALLS, MATHEMATICAL MODELS, EULER ANGLES, LAGRANGIAN FUNCTIONS

DESCRIPTIVE NOTE: Annual rept. Jul 83-Jul 84,

AUG 84 14p

PERSONAL AUTHORS: Aggarwal, S. ; Bishop, R. ; Sirignano, M. A. ; Sommer, H. T. ;

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

CONTRACT NO. AFOSR-80-0203

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-85-0498

UNCLASSIFIED REPORT

ABSTRACT: (U) A detailed parametric study of the ignition of a monodisperse fuel-air spray in contact with a hot wall was conducted. The theoretical model was one-dimensional unsteady and employed a hybrid Eulerian-Lagrangian numerical scheme. Effects of drop size, chemical kinetics, fuel-air ratios, fuel type and other parameters were examined. The results indicated the statistical character of the spray ignition, the existence of optimum droplet size and optimum fuel-air ratio for the minimum ignition delays. The study was extended to the polydisperse spray. The major conclusion was that the polydisperse results can be correlated with an equivalent monodisperse spray represented by a mean diameter based on the total spray surface area. The study of ignition for sprays flowing over a hot plate as initiated. The formulation and the numerical coding were completed. Currently the code is being employed to predict the ignition delays for the flowing sprays. Preliminary experiments were conducted to investigate the ignition of a single droplet stream along a heated surface. The results show an optimal distance from the surface for the droplet stream. It is speculated that this distance depends on the characteristic evaporation time, diffusion time and convective time inherent to the

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GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE
ENGINEERING

(U) Investigation of the Flame-Acoustic Wave Interaction
during Axial Solid Rocket Instabilities.

DESCRIPTIVE NOTE: Interim scientific rept.,

APR 85 19P

PERSONAL AUTHORS: Zinn, B. T. ; Daniel, B. R. ;

CONTRACT NO. AFOSR -84-0082

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0561

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of this study is the determination of the fundamental mechanisms responsible for the driving of axial instabilities by solid propellant flames. During the report period, the behavior of a premixed flame stabilized on the side wall of a duct in the presence of an axial acoustic field was investigated both theoretically and experimentally. The developed model solutions show that driving occurs due to the combustion process heat addition while outside the reaction zone the waves are damped by viscous processes. This damping increases as the thickness of the acoustic boundary layer increases. Experimental facilities for studying oscillating duct flow in the presence and absence of flames were developed. Cold flow studies verified the presence of an excess velocity region within the acoustic boundary layer (i.e., the Richardson Effect) and the dependence of the boundary layer thickness upon the frequency and wall injection velocity. Reactive flow studies showed that the behavior of the flame depends upon its location relative to the standing acoustic wave. When the flame was positioned next to a velocity antinode, unexpected instabilities appeared on its surface eventually resulting in severe flame distortion. Also, the measured C-C and C-H radiation signals were periodic and they oscillated with the same frequency as the

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GEORGIA INST OF TECH ATLANTA SCHOOL OF INDUSTRIAL AND SYSTEMS ENGINEERING

(U) Compound Poisson Approximations for Sums of Random Variables.

MAY 85 17P

PERSONAL AUTHORS: Serfozo, R. F. ;

CONTRACT NO. AFOSR-84-0367

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0623

UNCLASSIFIED REPORT

ABSTRACT: (U) This document shows that a sum of dependent random variables is approximately compound Poisson when the variables are rarely nonzero and, given they are nonzero, their conditional distributions are nearly identical. It gives several upper bounds on the total-variation distance between the distribution of such a sum and a compound Poisson distribution. Included is an example for Markovian occurrences of a rare event. The bounds are consistent with those that are known for Poisson approximations for sums of uniformly small random variables. (Author)

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), *RANDOM VARIABLES, MARKOV PROCESSES, DISTRIBUTION FUNCTIONS

IDENTIFIERS: (U) *Poisson approximation, WUAFOSR2304A5, PEG1102F

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CORNELL UNIV ITHACA NY BAKER LAB

(U) Studies of Energy Storage and Transfer in Gas Lasers.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 82-28 Feb 85.

APR 85 12P

PERSONAL AUTHORS: Wiesenfeld, J. ;

CONTRACT NO. AFOSR-82-0037

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-85-0504

UNCLASSIFIED REPORT

ABSTRACT: (U) This experimental program was designed to elucidate the behavior of electronically excited atoms and molecules in gases and examine methods by which these species might generally be detected using laser-based spectroscopic techniques. To that end, several atomic and molecular states were observed using Resonance Multiphoton Ionization. In addition the photodissociative production of electronically excited states was investigated and the subsequent deactivation of excited atoms in collisional encounters with molecules studied. Keywords include: Lasers, Photochemistry, Energy transfer, Iodine, Kinetics, Potassium, Electronic excitation, and Mercury bromide.

DESCRIPTORS: (U) *PHOTOCHEMICAL REACTIONS, *GAS LASERS, *PHOTODISSOCIATION, *ENERGY STORAGE, ATOMIC ENERGY LEVELS, ATOMS, BROMIDES, DEACTIVATION, ELECTRONS, ENERGY TRANSFER, EXCITATION, GASES, IODINE, IONIZATION, LASERS, MERCURY, MOLECULAR STATES, MOLECULES, PHOTONS, POTASSIUM, PRODUCTION

IDENTIFIERS: (U) WUAFOSR2303B1, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

PITTSBURGH UNIV PA

(U) Identifiability under Approximation for an Elliptic Boundary Value Problem.

(U) The Dual Variable Method for Finite Element Discretizations of Navier/Stokes Equations.

DESCRIPTIVE NOTE: Interim rept..

85 15P

APR 85 41P

PERSONAL AUTHORS: Kunisch, K. ; White, L. W. ;
A. ; Sledge, F. R. ;

PERSONAL AUTHORS: Hall, C. A. ; Peterson, J. S. ; Parsching, T.

PERSONAL AUTHORS: Kunisch, K. ; White, L. W. ;

CONTRACT NO. AFOSR-80-0176, AFOSR-84-0131

REPORT NO. LCDS-85-13

PROJECT NO. 2304

CONTRACT NO. AFOSR-84-0398

TASK NO. A3

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0633

TASK NO. A1

MONITOR: AFOSR
TR-85-0554

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Necessary and sufficient conditions for identifiability of the diffusion coefficient in Galerkin approximations to a two point boundary value problem are derived for various choices of Galerkin subspaces. The results are further used to investigate output least squares identifiability and output least squares stability of the diffusion coefficient. Additional keywords: Numerical analysis; Matrices(Mathematics). (Author)

ABSTRACT: (U) The numerical solution of two-dimensional, transient, incompressible Navier-Stokes problems is considered in this reprint. (Author)

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), *BOUNDARY VALUE PROBLEMS, DIFFUSION COEFFICIENT, ELLIPSES, LEAST SQUARES METHOD, NUMERICAL ANALYSIS, OUTPUT, STABILITY, MATRICES(MATHEMATICS)

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, *NUMERICAL ANALYSIS, VARIABLES, FINITE ELEMENT ANALYSIS, TWO DIMENSIONAL, PROBLEM SOLVING, INCOMPRESSIBILITY, TRANSIENTS, REPRINTS

IDENTIFIERS: (U) Galerkin method, PEG1102F, WUAFOSR2304A1

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A3

SUPPLEMENTARY NOTE: Pub. in International Jnl. for Numerical Methods in Engineering, v21 p883-898 1985.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY

(U) Distibines, New One-Dimensional Materials.

DESCRIPTIVE NOTE: Final rept. 1 Jun 81-31 Mar 85.

MAY 85 11P

PERSONAL AUTHORS: Ashe, A. J., III ;

CONTRACT NO. AFOSR-81-0009

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0502

UNCLASSIFIED REPORT

ABSTRACT: (U) A large number of novel diarsines, distibines and dibismuthines have been prepared. It has been shown that thermochromic distibines and presumably the corresponding dibismuthines show a solid-phase association which is responsible for the intense color of their solid state. Dibismuthines react with a variety of reagents. The products invariably involve cleavage of the metal-metal bond. A new general synthesis of C-substituted heteroles has been developed. (Author)

DESCRIPTORS: (U) *METAL METAL BONDS, *HETEROCYCLIC COMPOUNDS, *DIATOMIC MOLECULES, CLEAVAGE, COLORS, INTENSITY, SOLID PHASES, SYNTHESIS(CHEMISTRY), THERMIONIC EMISSION, MOLECULAR STRUCTURE

IDENTIFIERS: (U) Stibines, Distibines, Diarsines, Dibismuthines, Heteroles, Thermochromic properties, PEG1102F, WUAFOSR2303B2

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WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

(U) Program to Develop an Optical Transistor and Switch.

DESCRIPTIVE NOTE: Research progress rept. 1 Sep 84-30 Mar 85.

MAR 85 39P

PERSONAL AUTHORS: Garbuny, M.; Henningsen, T.; Hopkins, R. H.

REPORT NO. 85-9F42-NUTRN-R1

CONTRACT NO. F49620-84-C-0103

MONITOR: AFOSR
TR-85-0487

UNCLASSIFIED REPORT

ABSTRACT: (U) Previous work has proposed and analyzed the concept of two light beams interacting with a suitable medium to the effect that one beam turns the second beam on or off (an optical switch), or that the modulation in the first beam is amplified in the second (an optical transistor). Switching action was also demonstrated experimentally in uranyl for switching rates up to several kHz. In the present work, a more general survey and analysis was undertaken to identify classes and species of materials for which a particularly effective switching or transistor action can be predicted theoretically. As a class, dense materials, including liquid dyes, have broad absorption band spectra, resulting in low-performance capabilities such as a low transistor gain. In contrast, media in which atomic transitions are free, or shielded, from the fields of other atoms have, as switches and transistors, relatively high speeds of response and low demands on radiation power and mass of interacting materials. As special examples of this class, the performance characteristics of lithium and sodium were calculated and the implications of the results discussed with respect to further action. Keywords include: Optical, Switch, Transistors, Absorption, Relaxation, Rate, Cross sections, Lithium, Sodium, Transition, Line and Bands.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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DESCRIPTORS: (U) *GAIN, *ABSORPTION SPECTRA, *OPTICAL SWITCHING, *TRANSISTORS, *MODULATION, ABSORPTION, ATOMS, BAND SPECTRA, BROADBAND, CROSS SECTIONS, DYES, ELECTRON TRANSITIONS, HIGH DENSITY, HIGH VELOCITY, INTERACTIONS, LIQUIDS, LITHIUM, LOW LEVEL, MASS, MATERIALS, OPTICAL PROPERTIES, PERFORMANCE(ENGINEERING), POWER, RADIATION, RATES, RESPONSE, SODIUM, SURVEYS, SWITCHING

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Structure Calculations for Silane Polymers: Polysilane and Poly(dimethylsilylene).

85 7P

IDENTIFIERS: (U) PE61102F

PERSONAL AUTHORS: Damewood, J. R., Jr.; West, R. ;

CONTRACT NO. F49620-83-C-0044, AFOSR-82-0087

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0574

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v18 n2 p159-164 1985.

ABSTRACT: (U) The structure and conformational energies of polysilane, H-(SiH₂)_n-H, and poly(dimethylsilylene), Me-(SiMe₂)_n-Me, have been investigated by using full relaxation empirical force field (EFF) techniques. Gauche conformational states are calculated to be lowest in energy for both polymers. These results contrast with polyethylene hydrocarbon polymers which typically adopt trans conformations in the ground state. Both polysilane and poly(dimethylsilylene) are calculated to be conformationally more flexible than polyethylene.

DESCRIPTORS: (U) *POLYSILANES, *MOLECULAR STRUCTURE, MOLECULAR ENERGY LEVELS, RELAXATION, ELECTRONIC STATES, REPRINTS

IDENTIFIERS: (U) Silylene/polydimethyl, PE61102F, WUAFOSR2303B2

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Phase Equilibria in Liquid Crystalline Systems. Part 1.
Synthesis and Liquid Crystalline Properties of
Oligomers of the p-Oxybenzoate Series.

84 9P

PERSONAL AUTHORS: Ballauff, M.; Wu, D.; Flory, P. J.;
Barrall, E. M., II;

CONTRACT NO. AFOSR-82-0009

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0483

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Berichte der Bunsen-
Gesellschaft fuer Physikalische Chemie, v88 p524-530 1984.

ABSTRACT: (U) Characteristics temperatures T^* have been
evaluated for the oligometric p-oxybenzoates, C₆H₅CO(-
OC₆H₄CO)_n-2 -OC₆H₅ from the transition temperatures T_{sub}
N presented in the preceding paper. For n = 3, 4 and 5
they are, respectively, 343, 316 and 306 K. These
parameters that measure the intensities of the
orientation-dependent intermolecular interactions are
correlated with the optical anisotropy Δa and the
average intermolecular cohesive energy expressed by the
characteristics pressure p^* . The characteristic
temperature T^* decreases slightly with chain length. The
lattice theory of nematic fluids is extended to include
mixtures of rodlike molecules having different
characteristic temperatures T^* in order to treat binary
and ternary mixtures of the p-oxybenzoate oligomers. The
wide biphasic gaps predicted for the several binary
systems and the concomitant pronounced partitioning of
the components between the nematic and isotropic phases
are not confirmed by experiments. Compositions of the
coexisting phases in ternary systems were found to be
identical within limits of experimental determinations.
These marked departures from theory are explicable on the
premise that facile rotational diffusion of the

nematogens here considered, which are of comparatively
low chain length, leads to rapid generation of ordered
domains of large dimensions. Subsequent diffusional
transport over the required distances consequently is
very slow. The transition temperatures observed in binary
systems are in excellent agreement with calculations
carried out in the single component approximation using
mean values of the axial ratio and of T^* for the mixture.

DESCRIPTORS: (U) *LIQUID CRYSTALS, *POLYMERS, *BENZOATES,
*PHASE TRANSFORMATIONS, THERMODYNAMICS, TRANSITION
TEMPERATURE, CRYSTAL STRUCTURE, STATISTICAL MECHANICS,
REPRINTS

IDENTIFIERS: (U) Benzoate/p-oxy, PE61102F, WUAFOSR2303A3

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ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) Event-Related Brain Potentials in the Study of Consciousness,
DESCRIPTORS: (U) *CONSCIOUSNESS, ELECTROENCEPHALOGRAPHY,
BRAIN, INFORMATION PROCESSING, PSYCHOPHYSIOLOGY,
COGNITION, MEASUREMENT, REPRINTS

83 43P

IDENTIFIERS: (U) ERP(Event Related Potentials), P300,
WUAFOSR2313A4, PE61102F

PERSONAL AUTHORS: Donchin,E. ;McCarthy,G. ;Kutas,M. ;
Ritter,W. ;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0582

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Consciousness and Self-
Regulation, v3 p81-121 1983.

ABSTRACT: (U) In this chapter, we review studies of event-related brain potentials(ERPs) that address, either explicitly or implicitly the phenomena of consciousness. An analysis of the methodology and findings of these studies leads to an examination of their conceptual foundations. It is our contention that these studies can benefit from recognizing the fundamental difference between the data on consciousness and the data on brain potentials. The data on consciousness take the form of introspective reports. That is, subjects report, either in words or by the manipulation of mechanical devices, about their consciousness. They may press a button labeled red, or state 'the red light was on', or report the number of times the red light was illuminated over a period of time. The datum provided by the subject is the product of multiple brain processes, conscious and nonconscious. Electrical brain activities recorded on the scalp are, on the other hand, data on one or more of the processes that may be involved in conscious experience. We shall endeavor to show how this distinction between processes and their products, if used to guide research in cognitive psychophysiology, might lead to a firmer foundation for the development of a psychobiology of consciousness.

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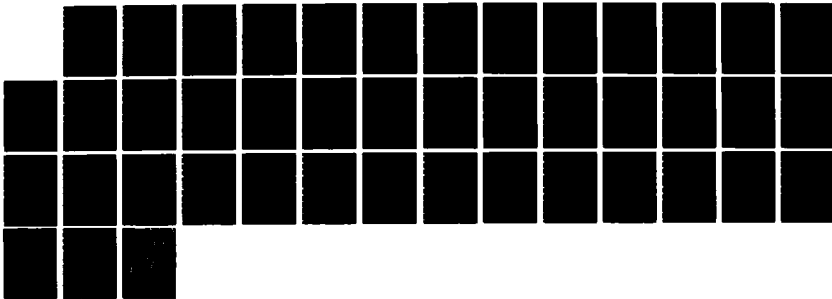
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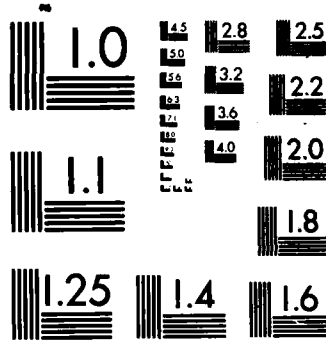
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CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Impact Resistance of Unfilled and Filled Bimodal
Thermosets of Poly(Dimethylsiloxane).

84 4P

PERSONAL AUTHORS: Tang, M. Y.; Letton, A.; Mark, J. E.;

CONTRACT NO. AFOSR-83-0027, NSF-DMR79-18903

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0513

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Colloid & Polymer Science,
v262 p990-992 1984.

ABSTRACT: (U) Incorporating very short (non-elastomeric) chains in an elastomeric network, thereby giving a bimodal distribution of chain lengths, is known to have a significant toughening effect. (In such networks, the short chains are thought to increase the ultimate strength because of their limited extensibility, and the long chains to retard the spread of rupture nuclei). The present investigation considers the related possibility of incorporating very long (elastomeric) chains in a relatively brittle thermoset in an attempt to improve its impact resistance. Bimodal networks of poly(dimethylsiloxane) (PDMS) are employed, both in the unfilled state and after filling by the in-situ precipitation of reinforcing silica particles.

DESCRIPTORS: (U) *THERMOSETTING PLASTICS, *SILOXANES,
*IMPACT STRENGTH, POLYMERS, METHYL RADICALS, ELASTOMERS,
RUPTURE, REPRINTS

IDENTIFIERS: (U) Bimodal networks, Siloxane/
polydimethyl, WUAFOSR2303A3, PE61102F

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ROCKWELL INTERNATIONAL CANOGA PARK CA ROCKETDYNE DIV

(U) Bis-Pentafluorotelluriumoxide Fluorocarbons,

85 9P

PERSONAL AUTHORS: Schack, C. J.; Christie, K. O.;

CONTRACT NO. F49620-81-C-0020

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-0518

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,
v27 p53-60 1985.

ABSTRACT: (U) The reaction of xenon bis-pentafluorotelluriumoxide, Xe(OteF5)2, with the haloolefins: CF2-CFC1 double bond, CF2-CC12 double bond, and CF2-CFH double bond, results in the high yield addition of two TeF50-groups to the double bond. These compounds are the first examples of Rf(OteF5)2 compounds in which Rf is not perfluorinated. For perfluorobutadiene, saturation of both double bonds occurs readily to give 1, 2,3,4(TeF50)4C4F6 in 97% yield.

DESCRIPTORS: (U) *FLUORINATED HYDROCARBONS, *TELLURIUM COMPOUNDS, *OXIDES, *SYNTHESIS(CHEMISTRY), XENON, CHEMICAL BONDS, SATURATION, REPRINTS

IDENTIFIERS: (U) Oxide/Xenonbis-Pentafluorotellurium,
WUAFOSR2303B2, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 509 CONTINUED

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) A Phenomenological Approach to the Calculation of the Diffusion Coefficient for Si on Si(111) Using Classical Trajectories.

FEB 85 11P

PERSONAL AUTHORS: NoorBatcha, I.; Raff, L. M.; Thompson, D. L.;

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0507

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v82
n3 p1543-1550, 1 Feb 85.

ABSTRACT: (U) A general method to calculate a lower bound and an estimated upper bound for the surface diffusion coefficient from jump frequencies of an atom from one adsorption site to another has been formulated. This method has been applied to the surface diffusion of Si on Si(111). Keating's potential has been used for the Si(111) lattice. The interaction potential between the adatom and the lattice is a pairwise sum of 60 Morse potentials involving the Si atoms in the first and second layers of the crystal. This potential formulation predicts the existence of two different types of adsorption sites on the Si(111) surface. The jump frequencies from these adsorption sites have been calculated by classical trajectory methods. Using these jump frequencies, a lower bound for the diffusion coefficient is calculated by solving a set of coupled phenomenological kinetic equations describing the jumping of adatoms between adjacent adsorption sites. The results at 800, 1000, 1200, and 1500 K yield a lower bound for the diffusion coefficient of $D > (8.53 + \text{or} - 1.11) \exp(-2430 + \text{or} - 270)/RT$ sq cm/s. At 1500 K, the computed mean-square displacement and velocity autocorrelation function give diffusion coefficients of .0711 and .0869

sq cm/s, respectively, which is in excess of the calculated lower bound at 1500 K by about a factor of 2. This suggests that diffusion of Si on Si(111) involves highly correlated motion. An estimate for the upper bound for the diffusion coefficient is obtained by removing from the set of coupled kinetic equations all terms involving adatom motion which leads back toward the original adsorption site.

DESCRIPTORS: (U) *SILICON, *CRYSTALS, *DIFFUSION COEFFICIENT, VAPOR DEPOSITION, ADATOMS, CRYSTAL LATTICES, FREQUENCY, ADSORPTION, TRAJECTORIES, REPRINTS

IDENTIFIERS: (U) WJAFOSR2303A2, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 493 12/1

AD-A158 491 11/10

ILLINOIS UNIV AT CHICAGO CIRCLE

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) A Study of BIB Designs through Support Matrices,
85 12P

(U) Elastomeric Properties of Bimodal Networks Prepared by
a Simultaneous Curing-Filling Technique,

JAN 85 4P

PERSONAL AUTHORS: Hedayat, A.; Pesotan, H.;

PERSONAL AUTHORS: Tang, M. Y.; Mark, J. E.;

CONTRACT NO. AFOSR-80-0170

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2304

PROJECT NO. 2303

TASK NO. A5

TASK NO. A3

MONITOR: AFOSR
TR-85-0815

MONITOR: AFOSR
TR-85-0516

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Statistical Planning
and Inference, v11 p363-372 1985.

SUPPLEMENTARY NOTE: Pub. in Polymer Engineering and
Science, v25 n1 p29-31 1985.

ABSTRACT: (U) This reprint deals with the existence and
nonexistence of balanced incomplete block designs with
repeated blocks. The approach is an algebraic one. The
concept of a support matrix is introduced and some of its
basic properties are noted. Some basic examples of
support matrices are given when the block size is 3. The
connection between full column rank proper support
matrices and irreducible designs is explored and some
examples of such matrices are given. (Author)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN,
*MATRICES(MATHEMATICS), SIZES(DIMENSIONS), REPRINTS

IDENTIFIERS: (U) BIB(Balanced Incomplete Blocks),
WUAFOSR2304A5, PEB1102F

DESCRIPTORS: (U) *ELASTOMERS, CURING, FILLING, SILICONES,
SILICATES, ETHYL RADICALS, REINFORCING MATERIALS, SILICON
DIOXIDE, REPRINTS

IDENTIFIERS: (U) Silicate/Tetraethylortho. WUAFOSR2303A3,
PEB1102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 474 11/10

AD-A158 473 20/12 20/5

CINCINNATI UNIV OH DEPT OF CHEMISTRY

MATERIALS RESEARCH SOCIETY UNIVERSITY PARK PA

(U) Simultaneous Curing and Filling of Elastomers.

(U) Laser Chemical Processing of Semiconductor Devices.

84 5P

DESCRIPTIVE NOTE: Final rept. 15 Nov 84-15 Nov 85.

PERSONAL AUTHORS: Mark, J. E. ; Jang, C. Y. ; Tang, M. Y. ;

NOV 84 135P

CONTRACT NO. AFOSR-83-0027

PERSONAL AUTHORS: Houle, F. A. ; Deutsch, T. F. ; Osgood, R. M. ;
Jr.;

PROJECT NO. 2303

CONTRACT NO. AFOSR-85-0004

TASK NO. A3

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR
TR-85-0514

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-85-0531

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v17 n12 p2613-2616 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) A method previously developed for the precipitation of reinforcing silica filler within an already cured elastomer is extended so as to permit simultaneous curing and filling. Specifically, tetraethyl orthosilicate is used to end-link hydroxyl-terminated chains of poly(dimethylsiloxane), with the excess present being hydrolyzed to finely divided SiO₂. Increase in the amount of filler thus formed decreases the elongation required for the desired upturns in modulus and increases the maximum extensibility, ultimate strength, and energy required for rupture of the network.

DESCRIPTORS: (U) *ELASTOMERS, *CURING, *FILLING, REINFORCING MATERIALS, SILICATES, FILLERS, HYDROLYSIS, SILICON DIOXIDE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

SUPPLEMENTARY NOTE: Pub. in Proceedings of Symposium B Fall Meeting of the Materials Research Society, Boston, MA, 27-29 Nov 84.

ABSTRACT: (U) Contents (Sections): Fundamental Mechanisms and Overall Review; Laser-Assisted Growth of Semiconductor Films; Process Diagnostics; Metallization from Thin Films and Gases; Fundamental Processes; Photochemical Etching; Dielectric Photoformation.

DESCRIPTORS: (U) *SEMICONDUCTOR DEVICES, *LASER APPLICATIONS, FABRICATION, MANUFACTURING, CHEMICAL ENGINEERING, LASER BEAMS, PHOTOCHEMICAL REACTIONS, SEMICONDUCTING FILMS, GROWTH(GENERAL), METALLIZING, THIN FILMS, GASES, ETCHING, DIELECTRICS, SYMPOSIA, ABSTRACTS, REPRINTS

IDENTIFIERS: (U) Dielectric photoformation, PE61102F, WUAFOSR2306B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 464 11/6

AD-A158 462 20/8

RENSELAER POLYTECHNIC INST TROY NY

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) US/Japan Seminar on Superalloys Held at Susono, Japan on 7-11 December 1984.

(U) Negative-Ion Formation from Surface Scattering at Finite Temperatures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-1 Mar 85.

JAN 85 7P

DEC 84 44P

PERSONAL AUTHORS: Stoloff, N. S. ;

PERSONAL AUTHORS: Liu, K. C. ; George, T. F. ; Lam, K. S. ;

CONTRACT NO. AFOSR-84-0282

REPORT NO. 54

PROJECT NO. 2306

CONTRACT NO. AFOSR-82-0046, NSF-CHE83-20185

TASK NO. A1

PROJECT NO. 2303

MONITOR: AFOSR

TASK NO. A2

TR-85-0348

MONITOR: AFOSR
TR-85-0517

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The US/Japan Seminar on Superalloys was held on December 7-11, 1984. The scope of Japanese work on superalloys is comprehensive, with papers presented on the following subjects: alloy development, processing, mechanical properties, surface stability (oxidation and hot corrosion), phase stability and alternative materials (especially intermetallic compounds). These subjects represent a marked expansion of Japanese efforts on superalloys since the previous meeting in 1972.

SUPPLEMENTARY NOTE: Pub. in Solid State Communications, v53 n1 p67-71 Jan 85.

ABSTRACT: (U) Temperature effects on negative-ion formation in positive-ion-surface scattering are studied within the framework of the time-dependent Anderson-Newns model. It is shown that the negative-ion formation is significantly enhanced at finite temperature T, provided K subscript B T is not less than the Anderson correlation energy U, where K subscript B is the Boltzmann constant. In the transient region (femtosecond timescale), temperature effects are, however, masked by large energy fluctuations. (Author)

DESCRIPTORS: (U) *SUPERALLOYS, FOREIGN TECHNOLOGY, JAPAN, PROCESSING, MECHANICAL PROPERTIES, OXIDATION, CORROSION, STABILITY, PHASE, SURFACE PROPERTIES, JET ENGINES

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1

DESCRIPTORS: (U) *IONIZATION, ANIONS, CATIONS, SCATTERING, SURFACES, TEMPERATURE, MODELS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 461 7/3

AD-A158 460 12/1 14/4

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

FLORIDA STATE UNIV TALLAHASSEE

(U) Reactions of Polyfluoroalkyl Fluorosulfates with Nucleophiles: An Unusual Substitution at the Sulfur-Fluorine Bond.

(U) Nonparametric Concepts and Methods in Reliability.

84

45P

DESCRIPTIVE NOTE: Rept. for Sep 82-Apr 85.

PERSONAL AUTHORS: Hollander, M. ; Proschan, F. ;

84 6P

CONTRACT NO. F49620-82-K-0007

PERSONAL AUTHORS: Kinkead, S. A. ; Kumar, R. G. ; Shreeve, J. M. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-82-0247, NSF-CHE81-00156

PROJECT NO. 2303

TASK NO. B2

TASK NO. A5

MONITOR: AFOSR TR-85-0622

UNCLASSIFIED REPORT

MONITOR: AFOSR TR-85-0509

SUPPLEMENTARY NOTE: Pub. in Handbook of Statistics, v4 p813-855 1984.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v106 n24 p7496-7500 1984.

ABSTRACT: (U) Polyfluoroalkyl fluorosulfates RfOSO2F(Rf-CF3CH2 double bond and (CF3)2CH) react with amines and alcohols or alkoxides to yield new polyfluoroalkyl sulfamates and dialkyl sulfate esters, respectively. Unlike both perfluoroalkyl fluorosulfates and alkyl fluorosulfates, the sulfur-oxygen bond in these polyfluoroalkyl fluorosulfates remains intact in the presence of hard nucleophiles. With methanethiol, however, nucleophilic attack occurs primarily at the alpha-carbon of CF3CH2OSO2F to give methyl 2,2,2-trifluoroethyl sulfide. (Author)

DESCRIPTORS: (U) *SUBSTITUTION REACTIONS, *SULFUR COMPOUNDS, *FLUORINE COMPOUNDS, NUCLEOPHILIC REACTIONS, POLYMERS, ALKYL RADICALS, SULFAMATES, ESTERS, SULFATES, SULFIDES, REPRINTS

IDENTIFIERS: (U) Nucleophiles, PE61102F, WUAFOSR230382

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ABSTRACT: (U) This reprint surveys the use of nonparametric methods in reliability theory. This survey is not complete, but focuses on classes of life distributions corresponding to various notions of aging. The authors have chosen this topic because a great deal of the nonparametric analysis in reliability is devoted to these classes of life distributions. Classes of life distributions based on notions of aging afford nonparametric statisticians an opportunity to consider problems of a character somewhat different from the usual. Instead of assuming that he knows nothing about the underlying life distribution, the statistician assumes that he does not know the parametric form of the life distribution, but that he does know, for example, that the failure rate is increasing. More generally, he knows that some type of aging property holds for the life distribution; this aging property gives rise to corresponding geometric property for the life distribution.

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, *RELIABILITY, THEORY, RATES, AGING(MATERIALS), GEOMETRY, LIFE EXPECTANCY(SERVICE LIFE), FAILURE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR23045

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 449 CONTINUED

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ULTRASYSTEMS INC IRVINE CA

(U) Syntheses of Novel Nitrogen and Phosphorus Heterocycles.

DESCRIPTIVE NOTE: Final rept. 1 Mar 82-28 Feb 85.

APR 85 62P

PERSONAL AUTHORS: Paciorek, K. L.; Nakahara, J. H.; Harris, D. H.; Smythe, M. E.; Kratzer, R. H.;

REPORT NO. SN-2007-F

CONTRACT NO. F49620-82-C-0021

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0500

UNCLASSIFIED REPORT

ABSTRACT: (U) 1-Dichlorophospha-3,5-perfluoro-n-heptyl (or perfluoroalkylether)-2,4,6-triazines were synthesized by interaction of imidoylamidines with phosphorus pentachloride. In a parallel approach, 1,3-bis(phenylchlorophospha)-5-perfluoroalkyl (or perfluoroalkylether)-2,4,6-triazines were obtained from the reaction of amidines with imido-diphenyl-diphosphinic acid pentachloride. Replacement of chlorine by thiophenyl and azido groups proceeded readily. Di-(phenylchlorophospha)-s-triazine was found to undergo further reaction with amidine in a 1:2 ratio. The existence of stereo-isomerism was indicated. The thiophenyl-substituted phospho-s-triazines functioned as corrosion and oxidation inhibitors in perfluoroalkylether fluids; however, their thermal and thermal oxidative stability was lower than that of the phenyl analogues. Both the mono- and diphospha-s-triazines were completely degraded in 24 hr at 318 C in nitrogen; diphenylsulfide was one of the major products. Mass spectral analysis of the phenyl-free phospho-s-triazines revealed that the specific breakdown patterns are ring specific not phenyl-substituent dependent. Perfluoro-n-octanonitrile was found to react with aniline both in the absence and

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 427 7/3

AD-A158 422 12/1

IDAHO UNIV MOSCOW

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL
ENGINEERING

(U) Synthesis and Structure Determination of 3,3,4,4-
Tetrafluoro-N-methyl-2-(cis,s-trans-methyl-NNO-azoxy)-
s-cis-1-cyclobutene-1-amine.

(U) Stability of an Exponentially Stabilizable System.

DESCRIPTIVE NOTE: Rept. for 1 Sep 82-1 Sep 84.

OCT 84 4P

85 3P

PERSONAL AUTHORS: Levan, N. ;

PERSONAL AUTHORS: Hope, H. ; Shoemaker, C. B. ; Shoemaker, D.
P. ; Marsden, H. M. ; Shreeve, J. M. ;

CONTRACT NO. AFOSR-79-0053

PROJECT NO. 2304

CONTRACT NO. AFOSR-82-0247

TASK NO. A8

PROJECT NO. 2303

MONITOR: AFOSR
TR-85-0546

TASK NO. B2

MONITOR: AFOSR
TR-85-0540

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry,
v50 n7 p1136-1137 1985.

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Automatic Control, VAC-29 n10 p939-941 Oct 84.

ABSTRACT: (U) A highly substituted fluorinated azoxy
cyclobutene amine is formed when methylamine is reacted
with heptafluoronitrosocyclobutane. This behavior has not
been described previously in the literature. When primary
amines and fluoroalkyl nitrosos are reacted, the usual
products are diazenes. (Author)

ABSTRACT: (U) This reprint discusses semigroup
generation regarding bounded linear operators on a
Hilbert space. Additional keywords: Steady state Riccati
equations.

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *AMINES,
MOLECULAR STRUCTURE, CYCLIC COMPOUNDS, BUTENES, FLUORINE,
METHYL RADICALS, REPRINTS

DESCRIPTORS: (U) *OPERATORS(MATHEMATICS),
*GROUPS(MATHEMATICS), LINEARITY, STEADY STATE, HILBERT
SPACE, RICCATI EQUATION, STABILITY, REPRINTS

IDENTIFIERS: (U) Azoxy compounds, WJAFOSR2303B2,
PE61102F

IDENTIFIERS: (U) *Semigroup(Mathematics), PE61102F,
WJAFOSR2304A8

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

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AD-A158 420 12/1 20/10

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL
ENGINEERING

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION
AND DECISION SYSTEMS

(U) Strong Stability of Quasi-Affine Transforms of
Contraction Semigroups and the Steady-State Riccati
Equation.

(U) Integration with Respect to Operator-Valued Measures
with Applications to Quantum Estimation Theory.

MAR 85 11P

84 40P

PERSONAL AUTHORS: Levan, N. ;

PERSONAL AUTHORS: Mitter, S. K. ; Young, S. K. ;

CONTRACT NO. AFOSR-79-0053

CONTRACT NO. AFOSR-82-0135, NSF-ENG76-02860

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A6

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0544

TR-85-0545

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Optimization Theory
and Applications, v45 n3 p397-406 Mar 85.

SUPPLEMENTARY NOTE: Pub. in Annali di Matematica pura ed
Applicata, v137 p1-39 1984.

ABSTRACT: (U) This reprint studies strong stability of
the class of strongly continuous Hilbert space semigroups
which are quasi-affine transforms of contraction
semigroups. Sufficient conditions for such a semigroup to
be approximately strong stable are given. Applications to
the stabilizability problem of Hilbert space semigroups,
using a feedback involving a solution of the steady-state
Riccati equation, are made. The key tool is the
generalization of the LaSalle invariance principle by
Hale.

ABSTRACT: (U) This paper is concerned with the
development of an integration theory with respect to
operator-valued measures which is required in the study
of certain convex optimization problems. These convex
optimization problems in their turn are rigorous
formulations of detection theory. The integration theory
which is developed in this paper is used in conjunction
with convex analysis in Banach spaces to give necessary
and sufficient conditions of optimality for this class of
convex optimization problems. (Author)

DESCRIPTORS: (U) *GROUPS(MATHEMATICS),
*TRANSFORMATIONS(MATHEMATICS), STABILITY, RICCATI
EQUATION, STEADY STATE, HILBERT SPACE, REPRINTS

DESCRIPTORS: (U) *OPERATORS(MATHEMATICS), *ESTIMATES,
*QUANTUM THEORY, OPTIMIZATION, THEORY, REPRINTS

IDENTIFIERS: (U) *Semigroups(Mathematics), PEG1102F,
WUAFOSR2304A6

IDENTIFIERS: (U) Integration theory, Convex optimization,
Banach spaces, Operator-valued measures, PEG1102F,
WUAFOSR2304A1

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SEARCH CONTROL NO. EVK15N

AD-A158 419 11/8

HENRY KRUMB SCHOOL OF MINES NEW YORK

(U) Hot Isostatic Consolidation of P/M Superalloys.

DESCRIPTIVE NOTE: Interim rept..

84 8P

PERSONAL AUTHORS: Kissinger, R. D. ; Nair, S. V. ; Tien, J. K.

CONTRACT NO. AFOSR-82-0352

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0676

UNCLASSIFIED REPORT

ABSTRACT: (U) The kinetics of powder consolidation, or densification, and the powder morphological changes occurring during hot isostatic pressing (HIP) are studied as a function of particle size distribution and hold time at HIP temperature for the nickel base superalloy RENE-85. In order to understand the extent of individual powder particle deformation during consolidation and its effect on subsequent prior particle boundaries (PPB), particle size distribution was studied as a variable. Particle size distributions studied include monosized (75-90 micrometers), bimodal (75-90 micrometers and 33-35 micrometers) and commercial (104 micrometers) size distribution. The experimental results of HIP densification kinetics are compared with a newly developed analytical deformation mechanism model for HIP consolidation which takes into account the effect of a distribution of particle sizes on the kinetics of densification. (Author)

DESCRIPTORS: (U) *HOT PRESSING, *ISOSTATIC PRESSING, *NICKEL ALLOYS, *POWDER METALLURGY, BOUNDARIES, DEFORMATION, DISTRIBUTION, KINETICS, MATHEMATICAL MODELS, PARTICLE SIZE, PARTICLES, POWDERS, TEMPERATURE, TIME

IDENTIFIERS: (U) Superalloys, PE61102F, WUAFOSR2306A1

AD-A158 419

UNCLASSIFIED

AD-A158 405 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Differential Methods in Inverse Scattering.

APR 85 27P

PERSONAL AUTHORS: Bruckstein, A. M. ; Levy, B. C. ; Kallath, T.

CONTRACT NO. AFOSR-82-0135, DAAG29-81-K-0057

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, ARO
TR-85-0552, 18133.100-EL

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Applied Mathematics, v45 n2 p312-335 Apr 1985.

ABSTRACT: (U) This reprint discusses a new set of differential methods for solving the inverse scattering problem associated to the propagation of waves in an inhomogeneous medium. By writing the medium equations in the form of a two-component system describing the interaction of rightward and leftward propagating waves, the causality of the propagation phenomena is exploited in order to identify the medium layer by layer. The recursive procedure that we obtain constitutes a continuous version of an algorithm first derived by Schur in order to test for the boundedness of functions analytic inside the unit circle. It recovers the local reflectivity function of the medium. Using similar ideas, some other differential methods can also be derived to reconstruct alternative parametrizations of the layered medium in terms of the local impedance or of the potential function. The differential inverse scattering methods turn out to be very efficient since, in some sense, they let the medium perform the inversion by itself and thus fully exploit its structure. They provide an alternative to classical methods based on integral equations, which, in order to exploit the structure of the problem, must ultimately resort to differential equations of the same type. (Author)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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DESCRIPTORS: (U) *INVERSE SCATTERING, *REFLECTIVITY,
*WAVE PROPAGATION, ALGORITHMS, INVERSION, METHODOLOGY,
LAYERS, FUNCTIONS, PROPAGATION, DIFFERENTIAL EQUATIONS,
INTEGRAL EQUATIONS, IMPEDANCE, EQUATIONS, WAVES,
STRUCTURAL PROPERTIES, CIRCLES,
TRANSFORMATIONS(MATHEMATICS), RECURSIVE FUNCTIONS,
REPRINTS

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Base-Promoted Rearrangement of Cage Alpha-Halo Ketones.
3, 3,6-Dibromotetracyclo(6,3,0,0(4,11),0(5,9)undecane-
2,7-dione,

85 3P

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

PERSONAL AUTHORS: Marchand, A. P. ; Reddy, D. S. ;

CONTRACT NO. DAAK10-84-M-2001, AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0472

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry,
v50 p724-725 1985.

ABSTRACT: (U) Treatment of 3,6-dibromotetracyclo(6,3,0,
0(4,11),0(5,9))undecane-2,7-dione (2) with solid sodium
hydroxide in tetrahydrofuran at 25 C for 4 h afforded 7-
bromopentacyclo-(5,4,0,0(2,6),0(3,10)0(5,9)undecane-8,11-
dione (4). Treatment of 2 with solid sodium hydroxide in
refluxing tetrahydrofuran for 4 h afforded instead
pentacyclo-(5,3,0,0(2,6),0(3,10)0(4,8)decane-5-one-2-
carboxylic acid (5). The intermediacy of 4 in the
rearrangement of 2 to 5 was demonstrated. These
rearrangements provide novel entries into the
pentacyclo(5,4,0,0(2,6),0(3,10),0,9)undecyl and 1,3-
bishomocubyl ring systems, respectively from a common
tetracyclic precursor (i.e., 2). (Author)

DESCRIPTORS: (U) *KETONES, *HALIDES, *MOLECULAR
STRUCTURE, SYNTHESIS(CHEMISTRY), CYCLIC COMPOUNDS,
BROMINE COMPOUNDS, DECANES, CARBOXYLIC ACIDS, REPRINTS

IDENTIFIERS: (U) Cubanes, Diones, WUAFOSR2303B2,
PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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SAINT LOUIS UNIV MO DEPT OF EARTH AND ATMOSPHERIC
SCIENCES

IDENTIFIERS: (U) Lg coda, Synthetic seismograms, Point
scattering, Body waves(Seismology), Mode conversion,
Spreading corrections, Shear waves, Seismic wave
scattering

(U) Lg Wave Excitation and Propagation with Application to
Nuclear Yield Determination.

DESCRIPTIVE NOTE: Final rept. 1 Apr 83-31 Mar 85.

MAY 85 77P

PERSONAL AUTHORS: Herrmann, R. B. ; Wang, C. Y. ;

CONTRACT NO. F49620-83-C-0087, ARPA Order-4751

MONITOR: AFOSR
TR-85-0581

UNCLASSIFIED REPORT

ABSTRACT: (U) Malin's (1980) first-order single scattering theory has been extended to study the scattering of surface waves as well as body waves by distributed point scatterers in a layered medium. The scattered waveform itself is generated and examined instead of its energy envelope. The theory used allows: 1) mode conversion; 2) wave type conversion; 3) finite scatterer distribution; and 4) the effect of attenuation from scattering as well as intrinsic absorption. The cases studied are for elastic or slightly attenuative media with any kind of source and receiver at any place in the layered structure. This direct calculation of coda waves provides us an immediate description of the relation of coda and scattering. The objectives are to find 1) the effect of layering on scattering; 2) the effect of scatterer distribution on recorded vertical and horizontal motion; 3) the relation of scattering Q to intrinsic Q; 4) the scattering behavior of surface and body waves; and 5) the superposition of scattering waves to form the coda. The generation of body waves by 'locked mode' approximation, which makes the body wave a subset of the 'surface wave,' is extensively studied.

DESCRIPTORS: (U) *SEISMIC WAVES, *SCATTERING, SURFACE WAVES, WAVE PROPAGATION, ATTENUATION, ABSORPTION, LAYERS, CONVERSION, AMPLITUDE, SEISMIC REFLECTION, SECONDARY WAVES, SHEAR PROPERTIES, APPROXIMATION(MATHEMATICS), YIELD(NUCLEAR EXPLOSIONS), DETERMINATION, SEISMIC DATA, SYNTHESIS, EARTHQUAKES

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AD-A158 389 CONTINUED

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

CURRENT, REPRINTS

(U) Effect of Polishing with Different Size Abrasives on the Current Response at a Rotating Disk Electrode, Levich current, Characteristic curves, PE61102F, WUAFOSR2303A1

85 6P

PERSONAL AUTHORS: Bruckenstein, S.; Sharkey, J. W.; Yip, J. Y.;

CONTRACT NO. AFOSR-83-0004

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0578

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v57 n1
p368-371 Jan 85.

ABSTRACT: (U) In this research group as well as other substantial emphasis has been placed on the surface preparation of rotating disk electrodes. This emphasis exists because the transition to turbulent flow can occur at much lower rotation speeds on an less perfectly polished rotating disk. We thought it worthwhile to study systematically the effect of polishing procedures on the Levich response of a rotating disk electrode. In the rotation speed range 400-8100 rpm, no significant effect on the Levich responses was observed for either gold or platinum RDE's polished with abrasives in the size range 0.5-14 μ . The maximum Reynolds number reached for the RDE's used in this study, radius approximately 0.4 cm, was about 1.4×10^4 , and was more than an order of magnitude lower than the critical value for onset of turbulence, 2.2×10^4 to the 4th power. An electrode whose surface appearance is reflective and relatively scratch-free is more than sufficient to obtain ideal Levich behavior. Time-consuming and tedious polishing with submicrometer-sized abrasives is unnecessary. (Author)

DESCRIPTORS: (U) *ELECTRODES, *SURFACE ROUGHNESS,
*TURBULENT FLOW, *DISKS, ELECTROCHEMISTRY, ABRASIVES,
VOLTAGE, REYNOLDS NUMBER, ROTATION, POLISHING, ELECTRIC

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SEARCH CONTROL NO. EVK15N

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AD-A158 387 7/4

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Collisional Quenching of Excited Iodine Atoms (5P(5) (2P1/2) by Cl₂ in a Flow System.

(U) Determination of Gaseous Hydrogen Sulfide by Cathodic Stripping Voltammetry after Preconcentration on a Silver Metalized Porous Membrane Electrode.

MAR 85 9P

PERSONAL AUTHORS: Hall, G. E. ; Arepalli, S. ; Houston, P. L. ; Wiesenfeld, J. R. ;

JUL 84 6P

PERSONAL AUTHORS: Opekar, F. ; Bruckenstein, S. ;

CONTRACT NO. F48620-83-K-0012

CONTRACT NO. AFOSR-83-0004

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B1

TASK NO. A1

MONITOR: AFOSR
TR-85-0539

MONITOR: AFOSR
TR-85-0579

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v82 n8 p2590-2597, 15 Mar 85.

SUPPLEMENTARY NOTE: Pub in Analytical Chemistry, v56 n8 p1206-1209 Jul 84.

ABSTRACT: (U) Time-resolved infrared emission from photolytically generated I*(2P1/2 state) has been studied in a slow flow apparatus. The total rate of deactivation of I*(2P1/2 state) by Cl₂ has been measured to be no more than 8 x 10 to the -15 cc cm³//molecule, substantially slower than previously reported. Evidence is presented for a very fast (k = 10 to the -10 cc/molecule/s) relaxation of I* by Cl atoms, which can account for both the earlier and the present observations.

DESCRIPTORS: (U) *IODINE, *ELECTRONIC STATES, PHOTOLYSIS, EXCITATION, ATOMIC ORBITALS, ATOMIC ENERGY LEVELS, QUENCHING, CHLORINE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

DESCRIPTORS: (U) *HYDROGEN SULFIDE, *ELECTRODES, *VOLTAMMETRY, SILVER, GAS ANALYSIS, SURFACES, TRACER STUDIES, ELECTROCHEMISTRY, REPRINTS

IDENTIFIERS: (U) Pneumatometry, Cathodic stripping voltammetry, PE61102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Quasiclassical Trajectory Studies of $H(D)+HBr(DBr)$ Abstraction and Exchange Reactions.

85 16P

PERSONAL AUTHORS: Sudhakaran, M. P. ; Raff, L. M. ;

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0534

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics, v95 p165-177 1985.

ABSTRACT: (U) The abstraction and exchange reaction dynamics for $H(D)+HBr(DBr)$ systems have been investigated on three LEPS potential-energy surfaces whose features are in accord with the surface topography suggested by recent molecular-beam and thermal experiments (abstraction barrier less than 1.0 kcal/mole, exchange reaction barriers of approx. 5.0 kcal/mole, and no attractive wells with a depth greater than 0.209 kcal/mole). The surfaces differ primarily in the magnitude of the abstraction barrier which varies from 0.19 to 1.01 kcal/mole. Reaction cross sections have been computed on each surface as a function of relative collision energy from the results of 139000 quasiclassical trajectories. Comparison of these results with measured relative abstraction cross sections suggests that the true abstraction barrier is very small, perhaps between 0.0 and 0.25 kcal/mole. However, thermal rate coefficients computed on the best surface at 300 K are about a factor of 2 larger than the most recently measured values. The calculated $(H,D)/(D,H)$ isotope ratio at 300 K lies between the two reported experimental results. The computed thermal activation energy for abstraction is 835 cal/mole, which is in good agreement with a very early measurement but a factor of 2.5 less than the most recently reported experimental result. These results

suggest that the molecular-beam and thermal rate measurements are inconsistent. In all reactions, the differential scattering cross sections are peaked in the backward direction for the molecular products, indicating a rebound mechanism. (Author)

DESCRIPTORS: (U) *CHEMICAL REACTIONS. *EXCHANGE REACTIONS. *HYDROGEN. *BROMINE. SURFACE CHEMISTRY. TRAJECTORIES. REACTION KINETICS. POTENTIAL ENERGY. REPRINTS

IDENTIFIERS: (U) Abstraction. PEB1102F. WUAFOSR2303A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Diagonstical Measurements in a Single Electrode.
Atmospheric Pressure, Microwave Plasma.

84 10P

PERSONAL AUTHORS: Kirsch, B. ; Hanamura, S. ; Winefordner, J.
D. ;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0523

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectrochimica Acta, v39B n8
p955-963 1984.

ABSTRACT: (U) Several important diagnostic parameters are determined for a single electrode atmospheric pressure plasma system described by HANAMURA et al 1,2. These include excitation temperatures and electron number densities and electron temperatures for various plasma gases at several different input powers. The variation of emission intensity with various plasma gases and their mixtures is investigated, as well as the effect of the chemical form of the sample on emission intensity, for the purposes of optimizing operating conditions for emission spectrochemical analysis. (Author)

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *ELECTRODES, COUPLING(INTERACTION), MICROWAVE EQUIPMENT, BAROMETRIC PRESSURE, CAPACITANCE, WATER VAPOR, REPRINTS, NITROGEN, MAGNETRONS, ARGON, HELIUM

IDENTIFIERS: (U) Microwave plasmas, Diagnostics(Plasma), Plasma Temperature, MPC(Microwave induced plasma), PE61102F, WUAFOSR2303A1

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FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Determination of Trace Levels of Water in Solid Samples by Evolved Gas Analysis/Helium Microwave Plasma Emission Spectrometry.

JAN 85 7P

PERSONAL AUTHORS: Hanamura, S. ; Kirsch, B. ; Winefordner, J.
D. ;

CONTRACT NO. F49620-84-C-0002

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0537

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v57 n1
p9-13, Jan 85.

ABSTRACT: (U) A method of determination of traces of adsorbed and/or bound water in solid samples is developed. This method is made up of the combination of thermal gas evolution and helium microwave plasma emission spectrometry. The solid sample is placed in a quartz crucible which is heated electrically in a He gas flow system and programmed power supply. Vaporized H2O is carried into the plasma, and the atomic emission line intensities of O and H are simultaneously measured by two spectrometers. Peak areas of oxygen and hydrogen are used to measure the concentration of H2O in the sample. A known volume of H2O is used for calibration. Several sample analyses are performed.

DESCRIPTORS: (U) *WATER ANALYSIS, *SPECTROMETRY, ATOMIC SPECTROSCOPY, HELIUM, GAS EVOLUTION, MICROWAVES, PLASMAS(PHYSICS), EMISSION SPECTROSCOPY, REPRINTS

IDENTIFIERS: (U) *Plasma emission spectrometry, PE61102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Linear Polysiloxanes from Dichlorosilane.

84 7P

PERSONAL AUTHORS: Seyferth, D. ; Prud'homme, C. C. ;

CONTRACT NO. AFOSR-83-0003

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-0520

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v23 n28
p4412-4417 1984.

ABSTRACT: (U) Polysiloxanes of type $RR'R''SiO(SiH_2O)_n$ (R, R', R'' = Me, Me, Me; Me, H, H.; Et, Et, Et; Me, Me, H) have been prepared by three different methods: (1) reactions of $C_1SiH_2O-(SiH_2O)_nSiH_2C_1$ with CH_3MgBr , Me_3SiOH , and Et_3SiOH ; (2) H_2SO_4 -catalyzed equilibration of cyclic (H_2SiO) oligomers with $Me_3SiOSiMe_3$; (3) cohydrolysis of $H_2SiC_1_2$ with Me_3SiC_1 and Me_2HSiC_1 using NaH_2PO_4/Na_2HPO_4 -buffered media. Lower species, $Me_2RSiO(SiH_2O)_nSiMe_2R$ (n = 1-3), were isolated and characterized (R = Me, H). (Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *POLYMERS, *SILOXANES, SILICON COMPOUNDS, CHLORIDES, HYDRIDES, ORGANIC COMPOUNDS, HYDROLYSIS, SILANES, REPRINTS

IDENTIFIERS: (U) Polysiloxanes, PE61102F, WUAFOSR2303B2

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) The Hydrolysis of Dibromo fluoromethyl Triphenylphosphonium Bromide.

82 7P

PERSONAL AUTHORS: Burton, D. J. ; Flynn, R. M. ; Manning, R. G. ; Kessler, R. M. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-0522

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v21 p371-376 1982.

ABSTRACT: (U) Hydrolysis of $(Ph_3PCFBr_2)Br(-)$ afforded a high yield of dibromofluoromethane and triphenylphosphine oxide. Hydrolysis in the presence of a radioactive isotope of bromine gave evidence that the mechanism of this reaction proceeds via the dibromofluoromethide ion and not via a bromofluorocarbene intermediate. (Author)

DESCRIPTORS: (U) *HYDROLYSIS, *BROMIDES, *PHOSPHONIUM COMPOUNDS, FLUORINE COMPOUNDS, METHYL RADICALS, PHENYL RADICALS, OXIDES, METHANE, SALTS, REPRINTS

IDENTIFIERS: (U) Bromide/dibromofluoromethyltriphenylphosphonium, PE61102F, WUAFOSR2303B2

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AD-A158 340 7/3 20/2

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(U) Use of Zeeman Atomic Absorption Flame Spectrometry for Measurements in C₂H₂/Air and C₂H₂/N₂O Flames.

(U) The Synthesis and X-Ray Crystal Structure of the Hexanuclear Metal Cluster Complex (Ir₃Pt₃(μ₃-CO)₃(CO)₃(eta-C₅Me₅)₃).

84 10P

PERSONAL AUTHORS: Sakai, T.; Hanamura, S.; Smith, B. W.; Winefordner, J. D.;

84 6P

PERSONAL AUTHORS: Freeman, M. J.; Miles, A. D.; Murray, M.; Orpen, A. G.; Stone, F. G. A.;

CONTRACT NO. F49620-84-C-0002

CONTRACT NO. AFOSR-82-0070

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A1

TASK NO. B2

MONITOR: AFOSR TR-85-0524

MONITOR: AFOSR TR-85-0541

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Spectroscopy Letters, v17 n12 p819-826 1984.

SUPPLEMENTARY NOTE: Pub. in Polyhedron, v3 n9/10 p1093-1097 1984.

ABSTRACT: (U) The Hitachi Zeeman atomic absorption spectrometer system is used to evaluate the influence of observation height and C₂H₂ flow rate upon the atomic absorption sensitivity (slope of calibration curve) and upon the atomic absorption signals for 6 elements in an C₂H₂/Air flame and for 3 elements in an C₂H₂/N₂O flame. Fuel-rich conditions result in greater absorption signals and sensitivities in all cases even though there is a significant temperature drop. Optimal observation heights for each case are evaluated. Greater linearity of analytical calibration curves occurs for fuel-rich conditions under Zeeman background correction than under no background correction. The Zeeman atomic absorption flame spectrometer should find more use in the future. (Author)

DESCRIPTORS: (U) *SPECTROMETRY, *ATOMIC SPECTROSCOPY, *ABSORPTION SPECTRA, *FLAMES, FUEL AIR RATIO, HYDROCARBONS, NITROUS OXIDE, ZEEMAN EFFECT, REPRINTS

IDENTIFIERS: (U) Atomic absorption spectrometry. PEG1102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 339 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Heptacyclo (5.5.1.14.10.02.6.03.11.05.9.08.12) tetradecane-13,14-bis (spiro-1 prime-cyclopentane): A New C22H28 Nonacyclic Cage Hydrocarbon. Improved Synthesis Bicyclo (2.2.1) hepta-2,5-diene-7-spiro-1 prime-cyclo-pentane,

85 4P

PERSONAL AUTHORS: Marchand, A. P. ; Wu, A. H. ;

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-0519

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Organic Chemistry, v50 p396-398 1985.

ABSTRACT: (U) An improved, five step synthesis of bicyclo(2.2.1) 2,2, thepta-2, 5-diene-7-spiro-1'-cyclopentane (1) which affords this material in 15% overall yield (starting with cyclopentadiene) has been developed. Thermal reaction of 1 with iron pentacarbonyl results in cycloaddimerization of 1, thereby affording heptacyclo 5.5.1.1(4.10).0(2,6).-03.11.0(5,9).0(8,12) tetradecane (3) in 41% yield. Compound 3 is a dendroasymmetric molecule with a perpendobiplanar structure belonging to point group D2d. (Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *HYDROCARBONS, CYCLIC COMPOUNDS, PENTANES, DIENES, DIMERS, CYCLOPENTENES, PENTADIENES, REPRINTS

IDENTIFIERS: (U) PE61102F, WJAFOSR230382

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AD-A158 333 7/4 7/3

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Adsorption and Desulfurization of Thiophene on Nickel(111),

85 9P

PERSONAL AUTHORS: Schoofs, G. ; Preston, R. ; Benziger, J. ;

CONTRACT NO. AFOSR-82-20332

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0532

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, v1 p313-320 1985.

ABSTRACT: (U) The adsorption and desulfurization of thiophene on clean and sulfided Ni(111) surfaces were studied with LEED, AES, TPR, and RAIS. The RAIS data indicate that thiophene adsorbs with its ring parallel or nearly parallel to the surface below room temperature. On clean Ni(111), thiophene polymerizes slightly above room temperature, as evidenced by paraffinic and aromatic C-H stretches in the reflection infrared spectrum and TPR product yields. Decomposition of the polymer aggregates produces a wide variety of hydrocarbons including C5 fragments at 470 K. On a more acidic sulfided Ni(111) surface (theta subscripts = 0.19), thiophene appears to undergo electrophilic attack at an alpha-carbon as evidenced by TPR products and by methane evolution from the reaction of 2,5-dimethylthiophene. An electrophilic attack by a surface metal atom at an alpha-carbon of thiophene is discussed in terms of molecular orbital theory.

DESCRIPTORS: (U) *THIOPHENES, *ADSORPTION, *DESULFURIZATION, SURFACE CHEMISTRY, REFLECTION, INFRARED SPECTRA, CHEMICAL ATTACK(DEGRADATION), NICKEL, REPRINTS

IDENTIFIERS: (U) Electrophilic reactions, PE61102F, WJAFOSR2303A2

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SPECTRON DEVELOPMENT LABS INC COSTA MESA CA

WUAFOSR2308A3

(U) Droplet Sizing Research.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 84-15 Jan 85.

APR 85 63P

PERSONAL AUTHORS: Hess, C. F. ;

REPORT NO. SDL-85-2286-12

CONTRACT NO. F49620-83-C-0060

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-85-0562

UNCLASSIFIED REPORT

ABSTRACT: (U) A method to measure the size and velocity of individual particles in a flow is discussed. Results are presented for controlled monodisperse sprays and compared to flash photographs. Typical errors between predicted and measured sizes are less than 5%. Experimental results of the probe volume size are satisfactorily compared to a theoretical algorithm. A very simple optical apparatus is described and used to characterize a spray produced by a simplex nozzle. The size distribution and the Sauter mean diameter of this spray are presented as a function of position and pressure. Originator-supplied keywords: Droplet sizing. Particle velocity. Mass flux. Nonintrusive. Advanced laser diagnostics.

DESCRIPTORS: (U) *SPRAYS, *DROPS, ALGORITHMS, DIAGNOSIS(GENERAL), DIAMETERS, FLASHES, FLUX(RATE), FUNCTIONS, LASERS, MASS FLOW, MEAN, OPTICAL EQUIPMENT, PARTICLES, PHOTOGRAPHS, POSITION(LOCATION), PROBES, SIZES(DIMENSIONS), VELOCITY, VOLUME, MEASUREMENT, PARTICLE SIZE, LASER BEAMS, DIAGNOSTIC EQUIPMENT, LASER VELOCIMETERS, INTERFEROMETRY, SPRAY NOZZLES, ALGORITHMS

IDENTIFIERS: (U) Monodisperse sprays, Flash photographs, Droplet size measurement, Simplex spray nozzles, PE61102F.

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AD-A158 314 21/8.2 21/2 20/4 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N
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ALABAMA UNIV IN HUNTSVILLE DEPT OF MECHANICAL
ENGINEERING

(U) Multi-Dimensional Combustion Instability Analysis of
Solid Propellant Rocket Motors.

DESCRIPTIVE NOTE: Final rept. 15 Mar 83-14 Mar 85.

MAY 85 47P

PERSONAL AUTHORS: Chung, T. J. ;

CONTRACT NO. AFOSR-83-0084

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0567

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1

ANALYSIS, *SOLID PROPELLANT ROCKET ENGINES, COMPUTATIONS,
MATHEMATICAL MODELS, FLOW FIELDS, FLAMES, VARIABLES,
AXISYMMETRIC GEOMETRY, BURNING RATE, DENSITY, GASES,
HYDRODYNAMICS, WAVES, OSCILLATION, RESPONSE, TURBULENT
FLOW, MOTION, VORTICES, COMBUSTION, DAMPING, PARTICLES,
COUPLING(INTERACTION), VELOCITY, TWO DIMENSIONAL FLOW,
THREE DIMENSIONAL FLOW, BOUNDARY LAYER

UNCLASSIFIED REPORT

ABSTRACT: (U) Analytical models are developed for the multi-dimensional combustion instability analysis of solid propellant rocket motors. This research was motivated by the need for improvement of the current practice in combustion instability analysis. For example, the burning rates and response functions are affected by the extremely complex flowfield. The flow is three-dimensional or at least two-dimensional in axisymmetric geometries; vortex motions and turbulent flows must be adequately calculated; the coupling mechanism of acoustic and hydrodynamic wave oscillations and particle damping should be clarified. These flowfield phenomena, after all, are originated from the flame zone activities - oscillatory behavior of all field variables such as temperature, velocity, pressure, density of the gas, and fuel fractions. The response functions, which serve as boundary conditions for the flowfield can be calculated from the first and second order perturbation eigenvalue analyses of the flame zone governing equations. The effect of velocity coupling appears, naturally, in the second order (nonlinear) solutions. All calculations are carried out using the finite element method. Some of the findings are summarized.

DESCRIPTORS: (U) *COMBUSTION STABILITY, *FINITE ELEMENT

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WISCONSIN UNIV-MADISON DEPT OF PHYSICS

GAPS, SUPERCONDUCTIVITY, ELECTRICAL RESISTANCE, NIObIUM
COMPOUNDS, NITRIDES, FERROMAGNETIC MATERIALS, TERNARY
COMPOUNDS, VANADIUM, SINGLE CRYSTALS, TRANSITION
TEMPERATURE, ULTRASONICS, MAGNETIC FIELDS, CRYOGENICS

(U) Thin Superconducting Film Characterization by Surface
Acoustic Waves.

DESCRIPTIVE NOTE: Research progress rept. 30 Sep 84-22
Apr 85.

IDENTIFIERS: (U) Thin superconducting films, Resistivity,
BCS value, PE61102F, WUAFOSR2306C1

APR 85 11P

PERSONAL AUTHORS: Levy, M. ;

CONTRACT NO. AFOSR-84-0350

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-85-0528

UNCLASSIFIED REPORT

ABSTRACT: (U) Both the dc electrical resistivity and the attenuation of surface acoustic waves (SAW) were measured in the superconducting state of a granular lead film as a function of an applied magnetic field normal to the film plane. At 4.2 K the data appear to yield an upper critical of about 60 K Gauss and a lower critical field of about 20 K Gauss. A theoretical model that takes into account renormalization has been developed for explaining the SAW attenuation in a superconducting NbN film with a sheet resistivity of 30 k ohms/sq. Bulk ultrasonic measurements in the ferromagnetic superconductors Er(x)Ho(1-x)Rh4B4 indicate that spin phonon interaction increases in the superconducting state of these ternary compounds. Ultrasonic measurements in very pure vanadium single crystals provide low temperature data which yield a zero temperature energy gap $2\Delta(T=0)$ that is very close to the BCS value of 3.5 kT sub c but the data close to the superconducting transition temperature T sub c would yield $2\Delta(T=0) = 4.2$ kT sub c. A theoretical model is being investigated to ascertain if it will resolve this apparent discrepancy.

DESCRIPTORS: (U) *SUPERCONDUCTORS, THIN FILMS,
LEAD(METAL), GRANULES, AMORPHOUS MATERIALS, ACOUSTIC
MEASUREMENT, SURFACE ACOUSTIC WAVES, ATTENUATION, ENERGY

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AD-A158 309 7/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Molecular and Electronic Structures of
Metallaspiropentanes.

85 2P

PERSONAL AUTHORS: Gordon, M. S. ; Boudjouk, P. ;

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0571

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical
Society, v107 p1439-1440 1985.

ABSTRACT: (U) The geometries and stabilities of a
silicon and carbon-based spiropentanes are calculated
using ab initio methods. The all-silicon compound is
found to be more stable than the carbon-containing system.
Both charge distribution and strain energy factors
stabilize the pentaspiropentane relative to the
tetraspiropentane structure. (Author)

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, *PENTANES,
*MOLECULAR STRUCTURE, *ELECTRONIC STATES, SILICON
COMPOUNDS, CARBON, CYCLIC COMPOUNDS, SILANES, REPRINTS

IDENTIFIERS: (U) Metallaspiropentanes, Silylenes,
Silenes, PE61102F, WUAFOSR230382

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NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) 1-Silaphenalenenes, Potential Precursors to Aromatic
Silylenium Ions and Aromatic Silyl Anions,
Spectroscopic and Chemical Studies.

84 10P

PERSONAL AUTHORS: Sooriyakumaran, R. ; Boudjouk, P. ;

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0569

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic
Chemistry, v271 p289-297 1984.

ABSTRACT: (U) Appearance potential measurements on 1,1-
dimethyl-1-silaphenalene (2, R = X = CH₃) and related
molecules show that silaphenalium ions do not
delocalize the positive charge throughout the entire pi
system like the hydrocarbon phenalene. Evidence for short
range delocalization by a vinyl group attached to silicon
was found in comparing appearance potentials of the
silaphenalium ion 2a with acyclic and saturated analogs.
Hydride abstraction reactions using hydride derivatives
of 2, 7, and 8 with Ph₃C(+)/SnCl₅(-) did not produce
detectable silylenium ions. NMR studies of the 1-
silaphenalenyl anion (2c) and related anions indicate
that the anion is not highly delocalized. Ultrasound
accelerates the reaction between potassium hydride and
several of the silanes.

DESCRIPTORS: (U) *SILANES, ANIONS, METHYL RADICALS, IONS,
POTASSIUM COMPOUNDS, HYDRIDES, NUCLEAR MAGNETIC RESONANCE,
ULTRASONICS, REPRINTS

IDENTIFIERS: (U) *Silaphenalenenes, Silylenium ions,
PE61102F, WUAFOSR230382.

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OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

dissociation. (Author)

(U) A Valence-Bond Potential-Energy Surface for Sillylene
Dissociation.

DESCRIPTORS: (U) *SILANES, *VALENCE, *CHEMICAL BONDS,
*CHEMICAL DISSOCIATION, ELECTRONS, POTENTIAL ENERGY,
SURFACES, HYDROGEN, COMPUTATIONS, REPRINTS

85 8P

PERSONAL AUTHORS: Viswanathan, R. ;Thompson, D. L. ;Raff, L.
M. ;

IDENTIFIERS: (U) *Sillylene, PE81102F, WUAFDSR2303A2

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0535

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry,
V89 p1428-1432 1985.

ABSTRACT: (U) A semiempirical valence-bond calculation of the SiH₂ potential-energy surface is reported. The VB wave function is written as a linear combination of the four bound eigenfunctions representing the canonical structures for the reactants and products of the two- and three-center dissociation channels. The matrix elements are evaluated semiempirically in a manner that incorporates the available experimental and ab initio CI data into the formalism. The effect of the silicon nonbonded electron pair is incorporated by addition of a bending potential term. Surface gradients are obtained by a generalization of the Hellmann-Feynman theorem. The resulting SiH₂ surface gives the correct bond energies and equilibrium distances for all diatomic products. The calculated reaction endothermicities for all dissociation channels are in agreement with the experimental results to within 6.7% or better. The computed equilibrium bond lengths and bond angle for SiH₂ are in fair accord with the corresponding experimental values. The errors in these quantities are +8.5% and -9.8%, respectively. The VB surface predicts a back-reaction barrier for Si + H₂ yield SiH₂ of 0.30 eV, which is in agreement with scaled SCF calculations. There are no attractive wells along the predicted reaction coordinate for three-center

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ROCHESTER UNIV NY DEPT OF CHEMISTRY

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METALS, NEUTRALIZATION, ATOMIC ENERGY LEVELS, COLLISIONS, ENERGY, APPROACH, DIAGRAMS, ENERGY LEVELS, PROBABILITY, REPRINTS, VALENCE BANDS, THEORY, VALIDATION

(U) A Diagrammatic Approach to Ion Neutralization at Surfaces: On the Validity of First-Order Perturbation Calculations.

IDENTIFIERS: (U) WUAFOSR2303A2, PE61102F

APR 85 13P

PERSONAL AUTHORS: Battaglia, F. ; George, T. F. ;

REPORT NO. 61

CONTRACT NO. AFOSR-82-0046, NSF-CHE83-20185

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0538

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Physics, v82 n8 p3847-3857, 15 Apr 85.

ABSTRACT: (U) A theoretical investigation of ion neutralization from positive-ion scattering from surfaces is presented in this reprint. Based on the time-dependent Fano-Anderson potential, a diagrammatic expansion of the reduced density matrix elements of the neutralized atom is given. Strictly speaking, the formalism holds only for systems in which the conduction band is completely empty, i.e., insulators, but conditions are given under which the formalism can be used for ion neutralization at metals. Calculations are performed for the simple case in which the atomic level is not degenerate. The validity of the first-order approximation is analyzed and its contribution to the neutralization probability is found to be dominant provided: (1) the discrete energy level of the atomic projectile is not embedded in the continuum of the valence band of the solid; and (2) the duration of the interaction is sufficiently short, i.e., the collision energy is high enough. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, *PERTURBATIONS, *IONS, *NEUTRALIZATION, ATOMS, NUCLEAR WEAPONS, CONDUCTION BANDS, DIAGRAMS, EXPANSION, INTERACTIONS, TIME, INSULATION, IONS.

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AD-A158 302 7/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) The Synthesis of the First Spiropentasilane,
Octamethylspiropentasilane,

84 4P

PERSONAL AUTHORS: Boudjouk, P. ; Sooriyakumaran, R. ;

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0568

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society,
Chemical Communications, p777-778 1984.

ABSTRACT: (U) The action of lithium metal on
tetrakis(dimethylbromosilyl)silane or
tetrakis(dimethylchlorosilyl)silane in tetrahydrofuran
produces the first spiropentasilane, a highly strained
polysilane that undergoes efficient cleavage reactions
with lithium aluminum hydride, methylmagnesium bromide,
and phosphorus pentachloride. (Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *POLYSILANES,
METHYL RADICALS, LITHIUM, BROMINE, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

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PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Characterization of Oxygen, Carbon, and Sulfur
Adlayers on W(211).

85 20P

PERSONAL AUTHORS: Benziger, J. B. ; Preston, R. E. ;

CONTRACT NO. AFOSR-82-0302, NSF-CPE80-24187

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0530

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v151 p183-
201 1985.

ABSTRACT: (U) Adlayers of oxygen, carbon, and sulfur on
W(211) have been characterized by LEED, AES, TPD, and CO
adsorption. Oxygen initially adsorbs on the W(211)
surface forming p(2 x 1)0 and p(1 x 1)0 structures.
Atomic oxygen is the only desorption product from these
surfaces. This initial absorption selectively inhibits CO
dissociation in the CO(beta 1) state. Increased oxidation
leads to a p(1 x 2)0 structure which totally inhibits CO
dissociation. Volatile metal oxides desorb from the p(1 x
2)0 surface at 1850 K. Oxidation of W(211) at 1200 K
leads to reconstruction of the surface and formation of
p(1 x n)0 LEED patterns, 3 < or = n < or = 7. The
reconstructed surface also inhibits CO dissociation and
volatile metal oxides are observed to desorb at 1700 K,
as well as at 1850 K. Carburization of the W(211) surface
below 1000 K produced no ordered structures. Above 1000 K
carburization produces a c(6 x 4)C which is suggested to
result from a hexagonal tungsten carbide overlayer. CO
dissociation is inhibited on the W(211)-c(6 x 4)C surface.
Sulfur initially orders into a c(2 x 2)S structure on
W(211). Increased coverage leads to a c(2 x 6)S structure
and then a complex structure. Adsorbed sulfur reduces CO
dissociation on W(211), but even at the highest sulfur
coverages CO dissociation was observed. Sulfur was found
to desorb as atomic S at 1850 K for sulfur coverages less

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than 7/6 monolayers. At higher sulfur coverages the dimer, S₂, was observed to desorb at 1700 K in addition to atomic sulfur desorption. (Author)

DESCRIPTORS: (U) *SURFACE CHEMISTRY, *TUNGSTEN, ADSORPTION, OXYGEN, CARBON, SULFUR, DESORPTION, OXIDES, SULFIDES, MOLECULAR STRUCTURE, REPRINTS

IDENTIFIERS: (U) WJAFOSR2303A2, PE61102F

AD-A158 293 3/1 20/5

OKLAHOMA STATE UNIV STILLWATER SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Modeling a Large Ring Resonator Gyroscope.

DESCRIPTIVE NOTE: Final rept. 1 Feb 84-31 Jan 85,

MAR 85 141P

PERSONAL AUTHORS: Bilger, H. R. ;

CONTRACT NO. AFOSR-84-0058

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR
TR-85-0526

UNCLASSIFIED REPORT

ABSTRACT: (U) The results obtained can be divided into three categories: a) A feasibility study with focus on quantum noise and low frequency noise b) Basic modeling of the ring with Gaussian beam and ray matrices c) Technical design: Effect of residual gas in ring on quality factor and light drag, scanning of beam, effect of misalignment and mismatch of source to ring, calibration procedures. The results show no obstacle yet to the goal of achieving a sensitivity of rotation rate of better than 10 to the -19th power (earth rate) in rings of 60 sq m size. Such a sensitivity which corresponds to a change of earth surface velocity of smaller than 4 cm/day, should surpass Lunar ranging methods. Lages methods as well as VLBI-methods in accuracy, besides being a 'real time' observational method for earth rotation.

DESCRIPTORS: (U) *EARTH(PLANET), *GYROSCOPES, *ROTATION, ACCURACY, CALIBRATION, ROTATION, FOCUSING, NOISE(ELECTRICAL AND ELECTROMAGNETIC), QUANTUM ELECTRONICS, DRAG, LIGHT, SIZES(DIMENSIONS), REAL TIME, MODELS, RATES, SURFACES, VELOCITY, RESONATORS, RINGS, LOW FREQUENCY, NOISE, MISALIGNMENT, GASES, RESIDUALS, QUALITY, SENSITIVITY, SCANNING, SOURCES

IDENTIFIERS: (U) PE61102F, WJAFOSR2305B2

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PITTSBURGH UNIV PA INST FOR COMPUTATIONAL MATHEMATICS AND APPLICATIONS

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Flujo no Isometrico en un Combustor de Cuerpo Central con Simetria Axial por el Metodo de Variables Duales (Non-Isometric Flow through a Axisymmetric Central Body Combustor via the Dual Variable Method).

(U) Coupled Photovoltaic Junction-Metal Dissolution Elements under Mass and Light Flux Variation.

85 14P

PERSONAL AUTHORS: Bruckenstein, S. ; Roamilla, J. M. ; Miller, B. ;

PERSONAL AUTHORS: Hall, C. A. ; Porsching, T. A. ;

CONTRACT NO. AFOSR-83-0004

CONTRACT NO. AFOSR-80-0176, AFOSR-84-0131

PROJECT NO. 2303

TASK NO. A3

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0632

TR-85-0580

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Revista Internacional de Metodos Numericos para Calculo y Diseño en Ingenieria, v1 n1 p67-80 1985. Text in French; summary in English.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v89 n4 p677-681 1985.

ABSTRACT: (U) A predictive model to analyze the problems of fluid dynamics associated with axisymmetric center body combustors using the dual variables approach is presented. The numerical procedure developed is applied to the study of the isothermal and non-isothermal flow in a combustor. (Reprints)

ABSTRACT: (U) Our object is to describe the kinetics of semiconductor-based photo-electrochemical cells in terms of rigorously specified light and mass transport fluxes. In general, choosing the latter two experimentally controllable variables provided practical tests. The theory treats the total voltage applied across the semiconductor/solution interface as the sum of the voltage drop across the semiconductor and the potential associated with the electrochemical process. In particular, choosing the individually well-understood pair of elements (p-n Si, Hg dissolution) allowed us to test two aspects of the theory. One aspect requires an a priori model of both the semiconductor and electrochemical current-voltage responses. The second, more general approach describes the response in terms of the individual impedances of the semiconductor and electrochemical cell, and requires no detailed mechanistic knowledge. Agreement between experiment and theory for both approaches was excellent. Keywords include: photoelectrochemical cell, semiconductor electrochemistry, and mass and light flux control.

DESCRIPTORS: (U) *COMBUSTION, AXISYMMETRIC, BODIES, COMBUSTORS, NUMERICAL METHODS AND PROCEDURES, REPRINTS, VARIABLES, THERMAL PROPERTIES, FLUID DYNAMICS, MATHEMATICAL PREDICTION, REPRINTS

IDENTIFIERS: (U) Center body combustors, WUAFOSR2304A3, PEB1102F

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *PHOTOELECTRIC CELLS(SEMICONDUCTOR), *MASS TRANSFER, *PHOTOCONDUCTIVITY.

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CONTROL. ELECTRIC CURRENT, FLUX(RATE), INTERFACES, LIGHT, PHOTOCHEMICAL REACTIONS, RESPONSE, SEMICONDUCTORS, SOLUTIONS(GENERAL), VARIATIONS, VOLTAGE, SEMICONDUCTOR JUNCTIONS, P TYPE SEMICONDUCTORS, N TYPE SEMICONDUCTORS, SILICON, MERCURY, PHOTOVOLTAIC EFFECT

IDENTIFIERS: (U) WJAFOSR2303A1, PE61102F

AD-A158 282 7/4 4/1 20/10

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD QUANTUM CHEMISTRY GROUP

(U) Application of Quantum Chemistry to Atmospheric Chemistry.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.

SEP 84 118P

PERSONAL AUTHORS: Krauss, M. ; Stevens, W. J. ;

CONTRACT NO. AFOSR-ISSA-84-0000

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-85-0563

UNCLASSIFIED REPORT

ABSTRACT: (U) Analysis of the accuracy of the experimentally deduced dissociation energies of refractory metal salts requires a knowledge of the electronic structure of the molecules. Relativistic effective potentials (REP) have now made such calculations for metal containing molecules possible. The present report will describe our tests and applications of the effective potential method. We have just completed a review of the use of effective potentials in molecular quantum chemistry. The review is given in Section 2. In Section 3 the abstract is given for the paper on Relativistic Effective Potential SCF Calculations of AgH and AuH, which has been accepted by the Journal of Computational Chemistry. The preprint for the analysis of the Electronic Structure of FeO and RuO is given in Section 4. Analysis of the orbital structure establishes the basis for an Aufbau for the ground state of all the transition metal oxides in the first two rows. Preliminary results were reported for NdO⁺, NdO, and UO in last years report but a new set of CEP are now being developed for the lanthanides and actinides. This is a preliminary to a study of other lanthanide oxides and to polyatomic systems using the CEP. The abstract for the paper Compact Effective Potentials and Efficient Shared-Exponent Basis Sets for the First- and Second-Row Atoms

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is given in Section 5. Application to the analysis of the spectra of A12 is described in the abstract for the paper Electronic State of A12.

DESCRIPTORS: (U) *ATMOSPHERIC CHEMISTRY, *QUANTUM CHEMISTRY, ACCURACY, ACTINIDE SERIES, CHEMICAL DISSOCIATION, ELECTRONIC STATES, ENERGY, GROUND STATE, MOLECULES, OXIDES, POLYATOMIC MOLECULES, RARE EARTH ELEMENTS, REFRACTORY METALS, SALTS, TRANSITION METAL COMPOUNDS, MOLECULAR STRUCTURE, MOLECULAR ORBITALS, ALUMINUM

IDENTIFIERS: (U) WJAFOSR2301A4, PE61102F

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RASOR ASSOCIATES INC SUNNYVALE CA

(U) Close-Spaced High Temperature Knudsen Flow.

DESCRIPTIVE NOTE: Annual rept. 16 May 84-15 May 85.

JUN 85 16P

PERSONAL AUTHORS: McVey, J. B. ;

REPORT NO. NSR-22-3

CONTRACT NO. F49620-83-C-0068

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0576

UNCLASSIFIED REPORT

ABSTRACT: (U) This work continued to investigate thermionic energy conversion in the Knudsen (collisionless) operating mode. A SAVTEC-type converter with an interelectrode spacing of 18-22 microns was tested over a range of emitter temperatures up to about 1700 K. Maximum performance followed the predictions of vacuum-mode analysis for emitter temperatures below 1580 K. Above that temperature the converter operated in the unignited mode, with partial space-charge neutralization by surface ionization of cesium. It was found that collisionless and diffusion mode theories could be extended into the regime of maximum output power for the unignited mode (spacing and electron mean-free path about equal) to give good agreement with the experimental data. The Knudsen-mode thermionic converter with a structured emitter was also investigated. Analysis has shown that associative ionization between barium and cesium is unlikely to be the cause of the current enhancement observed in previously published work. An analysis which considered the trapping of positive ions in the emitter slots has given good qualitative agreement with published data. Work is continuing on this analysis. Parts for a structured emitter variable spacing converter have been constructed and are being assembled. Keywords: Thermionic energy conversion; Knudsen operating mode; Structured

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emitter; SAVTEC diodes.

DESCRIPTORS: (U) *THERMIONIC CONVERTERS, *THERMIONIC EMISSION, BARIUM, CATIONS, CESIUM, DIFFUSION THEORY, DIODES, EMITTERS, ENERGY, ENERGY CONVERSION, IONIZATION, NEUTRALIZATION, SLOTS, SPACE CHARGE, SURFACE PROPERTIES, TEMPERATURE, TRAPPING(CHARGED PARTICLES), IONIZATION, MOLECULAR PROPERTIES, HIGH TEMPERATURE

IDENTIFIERS: (U) Knudsen flow, SAVTEC diodes, Collisionless flow, Structured emitters, WUAFOSR2308A1, PEG1102F

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Detection of Polycyclic Aromatic Hydrocarbons by Active Nitrogen-Induced Chemiluminescence,

84 11P

PERSONAL AUTHORS: Jurgensen,H. A. ; Yu,T. ; Winefordner,J. D. ;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0536

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Canadian Jnl. of Spectroscopy, v29 n5 p113-120 1984.

ABSTRACT: (U) A gentle molecular excitation source based upon energy transfer from metastable nitrogen molecules in a nitrogen afterglow is presented. A dielectric discharge through flowing nitrogen is shown to generate a large population of metastable nitrogen molecules and very few nitrogen atoms. The effect of adding argon or helium to the afterglow is described. Chemiluminescence spectra of benzene, naphthalene and anthracene are presented. Limits of detection (LODs) for several polycyclic aromatic hydrocarbons (PAHs) and hydrocarbons are listed for single and multichannel detection. Most LODs with single channel detection are in the tenths of a nanogram range. Multichannel detection limits are poorer. Initial results of a hydrocarbon and a PAH mixture separated on a gas chromatographic column and multichannel detection are presented.

DESCRIPTORS: (U) *CHEMILUMINESCENCE, *NITROGEN, *AROMATIC HYDROCARBONS, POLYCYCLIC COMPOUNDS, SPECTRA, BENZENE, NAPHTHALENES, ANTHRACENES, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303A1, PEG1102F

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AD-A158 273 20/5

MICHIGAN UNIV ANN ARBOR SUPERCOMPUTER ALGORITHM RESEARCH
LAB

PHYSICAL SCIENCES INC ANDOVER MA

(U) Sparse Elimination on Vector Multiprocessors.

(U) Experimental and Theoretical Studies of Laser
Propulsion Phenomenology.

DESCRIPTIVE NOTE: Interim rept. 1 Nov 84-1 Apr 85.

DESCRIPTIVE NOTE: Final technical rept. 15 Jan 84-28 Feb
85.

APR 85 7P

MAR 85 37P

PERSONAL AUTHORS: Calahan, D. A. ;

CONTRACT NO. AFOSR-84-0098

PERSONAL AUTHORS: Rosen, D. ; Caledonia, G. ; Kemp, N. ; Krech,
R. ; Cowles, L. ;

PROJECT NO. 2304

REPORT NO. PSI-039, TR-505

TASK NO. A2

CONTRACT NO. F49620-83-C-0039

MONITOR: AFOSR
TR-85-0542

PROJECT NO. 2308

TASK NO. A1

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-85-0577

ABSTRACT: (U) Studies of microtasking with up to 16 CRAY
X-MP processors for LU decomposition of dense systems of
equations have given rise to hybrid algorithms. One issue
addressed has been the problem of memory bank conflicts,
which increases with the number of processors. Conflict
resistant algorithms have been developed. It is possible
to assembly-code the X-MP so that accesses are pre-
fetched into vector registers. Several reports have been
prepared recently under this effort, and a paper entitled
'Task Granularity Studies in a Many-Processor Cray X-MP'
has been accepted for publication in 'Parallel Computing.

DESCRIPTORS: (U) *ALGORITHMS, *MULTIPROCESSORS, CONFLICT,
RESISTANCE, ELIMINATION, REGISTERS(CIRCUITS), VECTOR
ANALYSIS, HIGH DENSITY, VECTOR ANALYSIS, EQUATIONS, DATA
STORAGE SYSTEMS, DATA MANAGEMENT

IDENTIFIERS: (U) Conflict resistant algorithms, Hybrid
algorithms, Memory bank conflicts, MUAFOSR2304A2,
PEB1102F

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ABSTRACT: (U) The work performed in this 2-year effort
involved two tasks: one dealing with issues related to
laser energy absorption in a pulsed thruster and the
other dealing with issues related to laser energy
absorption in a CW thruster. For the pulsed studies, the
first year's effort involved theoretical and experimental
investigations of the threshold requirements for
achieving laser-induced gas breakdown at short
wavelengths (< 1 micrometer). With these breakdown
studies completed, the next step, initiated in the second
year, was to determine the degree of pulsed laser energy
absorption that can be achieved in the laser-initiated
plasma. Toward this end pulsed laser energy deposition
studies were performed using a pulsed Nd:glass laser as
the energy source (wavelength = 1.05 micrometers, pulse
duration = 20 ns) and high pressure hydrogen and argon
gases as the absorption media. The percentage of laser
energy absorbed in the laser-produced plasma was
determined from measurements of the fraction of laser
energy transmitted through the breakdown region as well
as from optical interferometric measurements to determine
the strength of the laser-produced blast wave. The

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Initially deposited energy was inferred from the measured blast wave trajectories by comparing them with predicted trajectories calculated by a detailed hydrodynamic model. Results are presented for the energy deposition efficiency achieved in argon and hydrogen as a function of initial gas pressure (0.3 atm < P < 10 atm).

DESCRIPTORS: (U) *PROPULSION SYSTEMS, *PULSED LASERS, *THRUSTERS, ABSORPTION, ARGON, BREAKDOWN(ELECTRONIC THRESHOLD), DEPOSITION, EFFICIENCY, ENERGY GASES, PRESSURE, HYDRODYNAMICS, MODELS, ADSORPTION, MEDIA, ARGON, SOURCES, HIGH PRESSURE, HYDROGEN, LASERS, BLAST WAVES, INTERFEROMETRY, MEASUREMENT, OPTICAL PROPERTIES, PULSES, SHORT WAVELENGTHS, REQUIREMENTS, THRESHOLD EFFECTS, ENERGY, PLASMAS(PHYSICS), ENERGY ABSORBERS, THEORY, TRAJECTORIES

IDENTIFIERS: (U) WJAFOSR2308A1, PEG1102F

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STEWART OBSERVATORY TUCSON ARIZ

(U) Speckle Image Reconstruction. Appendix 2.

DESCRIPTIVE NOTE: Final rept.,

APR 85 322P

PERSONAL AUTHORS: Strittmatter, P. A. ;Hege, E. K. ;

CONTRACT NO. F19628-82-K-0025, NSF-AST81-13212

MONITOR: AFOSR
TR-85-0635-APP-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendix 1, AD-A158 271.
Sponsored in part by Grant NSF-AST82-01092.

ABSTRACT: (U) Partial contents: Size Measurement of a Geosynchronous Satellite Using the MMT (Multiple Mirror Telescope); Speckle Interferometry of Asteroids; High-Speed Digital Signal Processing for Speckle Interferometry; Seeing Calibration of Optical Astronomical Speckle Interferometric Data; Seeing Studies for Speckle Holographic Imaging; A self Calibrating Shift-and-Add Technique for Speckle Imaging; Physical Diameter and Images of Alpha Orionis; Image Reconstruction from Astronomical Speckle Interferometry; Recovery of Binary Star Orientation and Relative Intensity--A comparison of Power Spectrum in Stellar Speckle Interferometry; The Differential Speckle Interferometer; Statistical Analysis of the Self-Calibrating Shift-and-Add Image Reconstruction Technique; Adaptive Optics.

DESCRIPTORS: (U) *IMAGE PROCESSING, *INTERFEROMETRY, MIRRORS, TELESCOPES, ARIZONA, OPTICAL INTERFEROMETERS, SIGNAL PROCESSING, HIGH RATE, ADAPTIVE SYSTEMS, OPTICS, ASTRONOMY, SPECULAR REFLECTION, CALIBRATION, INTERFEROMETERS, DIGITAL SYSTEMS, DIAMETERS, PHYSICAL PROPERTIES, HOLOGRAPHY, IMAGES, ASTEROIDS, BINARY STARS, ORIENTATION(DIRECTION), COMPARISON, SYNCHRONOUS SATELLITES, POWER SPECTRA, INTENSITY, IMAGES, STATISTICAL ANALYSIS, STARS

IDENTIFIERS: (U) *Speckle interferometry, Image

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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reconstruction, MMT(Multiple Mirror Telescope), Adaptive optics

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STEWARD OBSERVATORY TUCSON ARIZ

(U) Speckle Image Reconstruction. Appendix 1.

DESCRIPTIVE NOTE: Final rept..

APR 85 56P

PERSONAL AUTHORS: Strittmatter, P. A. ; Hege, E. K. ;

CONTRACT NO. F19828-82-K-0025, NSF-AST81-13212

MONITOR: AFOSR
TR-85-0635-APP-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendix 2, AD-A158 272.
Sponsored in part by Grant NSF-AST82-01092.

ABSTRACT: (U) By adjusting the optical pathlengths of the MMT (Multiple Mirror Telescopes) telescopes, it is possible to make the MMT into a phased array with a 6.86 m baseline. A coherent, phased focus can be achieved with tilted focal planes if the tilt angle is chosen so that the internal phase differences exactly compensate the external phase differences. This amounts to a slight change in configuration such that the beams are brought together at $f/8.39$ rather than the originally designed $f/9$. We summarize experiments which have used the MMT subapertures as a phased array and as a coherent, phased telescope, and present a simple analysis of the tilted focal plane geometry for coherent observation. The phased operation of the MMT is important not only for obtaining high angular resolution, but also for obtaining the better discrimination sensitivity which results from the better discrimination against the sky emission background for infrared diffraction limited images. Full-aperture (six-beams), diffraction-limited results for the unresolved source Gamma Orinols, the well-known close binary Capella and the resolved red supergiant Betelgeuse, (including a diffraction limited differential speckle image of the latter) are presented.

DESCRIPTORS: (U) *TELESCOPES, *INFRARED IMAGES, COHERENCE, OBSERVATION, PHASE, EXTERNAL, DIFFRACTION, LIMITATIONS, PHASED ARRAYS, BACKGROUND, FOCUSING, DETECTION, SENSITIVITY, ANGLES, HIGH RESOLUTION, INTERNAL,

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AD-A158 269 12/1

OPERATION, SPECULAR REFLECTION, EMISSION, SKY, PLANE
GEOMETRY, TILT, FOCAL PLANES

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) A Note on the Integrated Cauchy Functional Equation.

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 11P

PERSONAL AUTHORS: Aizaid, A. A. ; Rao, C. R. ; Shanbhag, D. N.

REPORT NO. TR-85-19

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0549

UNCLASSIFIED REPORT

ABSTRACT: (U) A new proof is given using de Finetti's theorem on infinite sequence of exchangeable random variables for the solution of the integrated Cauchy functional equation studied by Lau and Rao (1982) in the continuous case and by Shanbhag (1977) in the discrete case. (Author)

DESCRIPTORS: (U) *EQUATIONS, *FUNCTIONAL ANALYSIS, INTEGRATED SYSTEMS, THEOREMS, CAUCHY PROBLEM, RANDOM VARIABLES, SEQUENCES(MATHEMATICS), SOLUTIONS(GENERAL)

IDENTIFIERS: (U) De Finetti's theorem

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 268 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Inference on the Ranks of the Canonical Correlation Matrices for Elliptically Symmetric Populations.

DESCRIPTIVE NOTE: Technical rept..

MAY 85 31P

PERSONAL AUTHORS: Krishnalah, P. R. ; Lin, J. ; Wang, L. ;

REPORT NO. TR-85-14

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0550

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors considered the likelihood ratio tests and some other tests for the ranks of the canonical correlation matrices when the underlying distributions are real and complex elliptically symmetric distributions. Also, asymptotic joint distributions of the eigenvalues of the sample canonical correlation matrices are derived under the assumptions mentioned above regarding the underlying distributions. Finally, applications of tests for the rank of the complex canonical correlation matrix in the area of time series in the frequency domain are discussed. Originator-supplied keywords: Asymptotic distributions, Complex distributions, Canonical correlations; Elliptical distribution; Time series.

DESCRIPTORS: (U) *POPULATION(MATHEMATICS), *DISTRIBUTION, STATISTICAL TESTS, EIGENVALUES, MATRICES(MATHEMATICS), CORRELATION

IDENTIFIERS: (U) Likelihood ratio tests, Correlation matrices, Elliptically symmetric distributions, Asymptotic joint distributions, Time series, WUAFOSR2304A5, PE81102F

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) An Alternated Derivation of the Distribution of the Conditioned Signal-to-Noise Ratio.

DESCRIPTIVE NOTE: Technical rept..

MAY 85 12P

PERSONAL AUTHORS: Hanumara, R. C. ;

REPORT NO. TR-85-18

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0548

UNCLASSIFIED REPORT

ABSTRACT: (U) A result in multiple regression analysis is used to derive the probability distribution of the conditioned signal-to-noise ratio. (Author)

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, *SIGNAL TO NOISE RATIO, REGRESSION ANALYSIS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Spectra for Large Dimensional Random Matrices.

(U) On Asymptotic Distribution of the Test Statistic for the Mean of the Non-Isotropic Principal Component.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

MAY 85 14P

MAY 85 16P

PERSONAL AUTHORS: Yin, Y. Q.; Bai, Z. D.;

PERSONAL AUTHORS: Fang, C.; Krishniah, P. R.;

REPORT NO. TR-85-17

REPORT NO. TR-85-20

CONTRACT NO. F49620-85-C-0008

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0547

MONITOR: AFOSR
TR-85-0551

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors reviewed some recent developments in the area of large dimensional random matrices. Originator-supplied keywords: Eigenvalues; Large dimensions; Largest eigenvalue; Limiting spectral distribution; Multivariate F matrix; Random matrices; Sample covariance matrix; Smallest eigenvalues.

ABSTRACT: (U) Data analysts are often confronted with the problem of large dimensional data. In some of these situations, it is customary to reduce the dimensionality of the problem by using principal component analysis and to perform statistical analysis of the data using the new variables (principal components). For example, the new variables are used in the area of classification.

DESCRIPTORS: (U) *MATRICES(MATHEMATICS), EIGENVALUES, LIMITATIONS, SPECTRAL ENERGY DISTRIBUTION, MULTIVARIATE ANALYSIS, COVARIANCE

IDENTIFIERS: (U) *Random matrices, F matrix

Chestnut and Floyd (1981) used the principal components as variables in identification of underwater targets. However, the statistical data analysis using the principal components is adhoc since the distributions of the test statistics based upon the principal components are complicated when the covariance matrix is unknown. Very little work was done in the literature on deriving the distributions of these test statistics even in the asymptotic case. In this paper, we derive the asymptotic distribution of the t statistic based upon the new variable (the most important principal component) instead of using any of the original variables. The above asymptotic distribution is shown to be Student's t distribution. The accuracy of the above approximation is studied by comparing the simulated values using the asymptotic expression with the standard Student's t table. It is found that the accuracy of the above approximation

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is sufficient for many practical situations.

MASSACHUSETTS INST OF TECH CAMBRIDGE

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *STATISTICAL DATA, ACCURACY, ANALYSTS, ANISOTROPY, ASYMPTOTIC SERIES, CLASSIFICATION, DISTRIBUTION, IDENTIFICATION, MEAN, SIMULATION, STATISTICAL TESTS, STUDENTS, UNDERWATER TARGETS, VALUE, VARIABLES

(U) Idiot's Guide to OZ: A Manual for the Complete Beginner, Introducing EMACS, the Word Processing Program, and TEX, the Text Formatting Program,

84 72P

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A5

PERSONAL AUTHORS: Gilson, W. ;

CONTRACT NO. F49620-83-C-0135, NSF-MCS79-23110

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0583

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *TEXT PROCESSING, MINICOMPUTERS, DATA PROCESSING TERMINALS, COMPUTER PROGRAMS, OPERATION, COMPUTER FILES, EDITING, PRINTING, FORMATS, CONTROL, ELECTRONIC MAIL, MANUALS

IDENTIFIERS: (U) *OZ computer, EMACS computer program, Tex computer program, BABYL computer programs, WJAFOSR2313A5, PEG1102F

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AUSTIN RESEARCH ASSOCIATES INC TX

DIMENSIONAL, SIMULATION, THEORY, ELECTRONS,
DISCRIMINATION, FREQUENCY, GROWTH(GENERAL), SIDEBANDS,
CIRCULATION, LOW LEVEL, POWER LEVELS, QUALITATIVE
ANALYSIS, STORAGE, TWO DIMENSIONAL, DIFFRACTION, WAVES

(U) Theoretical Studies of Two-Dimensional Effects in Free
Electron Lasers.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb-31 Oct 84.

IDENTIFIERS: (U) PEG110ZF, WUAFOSR2301A1

DEC 84 148P

PERSONAL AUTHORS: Rosenbluth, M. N. ; Wong, H. V. ; Moore, B.
N. ;

REPORT NO. I-ARA-84-U-121, ARA-525

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0493

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the development of a two-dimensional numerical simulation free electron laser code which includes pass-to-pass electromagnetic pulse evolution, wave diffraction, transverse betatron motion of the electrons, and frequency discrimination to suppress the growth of unstable sidebands. The code was used to simulate the experiment recently completed at TRW, the experiment being done at LANL, and the proposed MSNW experiment. The TRW simulations are in qualitative agreement with experimental results. The LANL simulations are similar to the one-dimensional simulations (1-D) trends which are similar to those of the MSNW 1-D simulations; in both, frequency discrimination improves the trapping efficiency and produces a smooth optical pulse. This report also discusses the feasibility of steady state operation of tapered wigglers in storage rings. Long smooth optical pulses are necessary to reduce energy spreading in the wiggler. Conventional tapered wigglers appear to require lower circulating power levels than phase area displacement wigglers. Additional keyword: Variable parameter wiggler.

DESCRIPTORS: (U) *BETATONS, *FREE ELECTRON LASERS,
*LIGHT PULSES, MOTION, PATTERNS, LIGHT PULSES, ONE

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

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AD-A158 123 7/4

RESEARCH TRIANGLE INST RESEARCH TRIANGLE PARK NC

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Study of Mean Free Path Effects on Growth of Ultrafine Metallic Aerosols.

(U) Adsorption and Orientation of Aromatic Compounds at Smooth Polycrystalline Platinum Electrodes.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 84-1 Feb 85,

84 7P

APR 85 20P

PERSONAL AUTHORS: Lawless, P. A. ;

PERSONAL AUTHORS: Soriaga, M. P. ; White, J. H. ; Song, D. ; Hubbard, A. T. ;

CONTRACT NO. F49620-84-C-0017

CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2306

PROJECT NO. 2303

TASK NO. C4

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0525

TR-85-0339

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) In the first year of this study on the dynamics of aerosol formation in gaseous atmospheres, the experimental facility was set up, using an exploding wire generator for the production of high concentrations of metallic aerosols. The initial experiments have been devoted to development of sampling methods for the reduced atmosphere environment and, then, to the observation of the types of behavior exhibited by single component aerosols.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalysis Chemistry, v171 p359-363 1984.

ABSTRACT: (U) A recent study has shown that aqueous solutions of weakly surface-active electrolytes such as ClO_4^- , HSO_4^- , H_2PO_4^- , PF_6^- and Cs^+ do not inhibit the spontaneous and irreversible oriented-adsorption of aromatic molecules at smooth polycrystalline Pt electrodes. Studies using structurally well-defined Pt single-crystals have also demonstrated the inertness of irreversibly adsorbed layers towards these supporting electrolyte solutions. However, initial studies using iodide solutions have indicated that strongly surface-active electrolytes may exert profound influences on the adsorption characteristics of organic compounds. It was observed, for example, that when a layer of flat-adsorbed aromatic intermediates was exposed to dilute aqueous iodide, desorption (depending on the nature of the aromatic species occurred (depending on the nature of the adsorbate and pH of the solution) along with adsorption of iodine. In ultra-high vacuum adsorbed molecule reorientation induced by coadsorption of iodine was indicated for dimethyl sulfoxide chemisorbed on Pt(III). In the present study, the effect of halide supporting electrolytes on the adsorption and orientation of hydroquinone (HQ) and 1,4-naphthoquinone (NHQ) at smooth polycrystalline Pt electrodes is examined in

DESCRIPTORS: (U) *AEROSOLS, *METALS, METHODOLOGY, SAMPLING, EXPLODING WIRES, CONCENTRATION(COMPOSITION), HIGH RATE, ATMOSPHERES, ENVIRONMENTS, REDUCTION, ULTRAFINES, AEROSOL GENERATORS, DYNAMICS, GASES, MEAN FREE PATH, PRODUCTION

IDENTIFIERS: (U) WJAFOSR2306C4, PEB1102F

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greater detail. This work focuses on competitive adsorption between halide and aromatic when both are present in the same solution in various proportions. Halide influences are indicated by differences in the adsorption profiles relative to the clean surface.

DESCRIPTORS: (U) *ADSORPTION, *AROMATIC COMPOUNDS, *ELECTROLYTES, LAYERS, IODINE, SOLUTIONS(MIXTURES), MOLECULES, SURFACES, DESCRIPTION, DILUTION, IODIDES, LIQUIDS, SOLUTIONS(GENERAL), ORGANIC COMPOUNDS, PH FACTOR, SURFACE ACTIVE SUBSTANCES, METHYL SULFOXIDE, ORIENTATION(DIRECTION), POLYCRYSTALLINE, PHENOLS, PLATINUM, ULTRAHIGH VACUUM, WATER

IDENTIFIERS: (U) WUAFOSR2303A1, PES1102F

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Parameter Identification in Continuum Models.

MAR 85 11P

PERSONAL AUTHORS: Banks,H. T. ;Crowley,J. M. ;

CONTRACT NO. DAAG29-79-C-0161, AFOSR-81-0198

MONITOR: ARO,AFOSR
16835.64-MA,TR-85-0553

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Astronautical Sciences, v33 n1 p85-94 Jan-Mar 85.

ABSTRACT: (U) This reprint discusses approximation techniques for use in numerical schemes for estimating spatially varying coefficients in continuum models such as those for Euler-Bernoulli beams. The techniques are based on quintic spline state approximations and cubic or linear spline parameter approximations. Both theoretical and numerical results are presented. Additional Keywords: Algorithms; Coefficients; and Structural beams. (Author)

DESCRIPTORS: (U) *CONTINUUM MECHANICS, *BEAMS(STRUCTURAL), *NUMERICAL METHODS AND PROCEDURES, ALGORITHMS, *APPROXIMATION(MATHEMATICS), CUBIC SPLINE TECHNIQUE, REPRINTS

IDENTIFIERS: (U) Euler bernoulli beams

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RENSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

(U) Numerical Methods for Stiff Systems of Two-Point Boundary Value Problems.

DEC 84 23P

PERSONAL AUTHORS: Flaherty, J. E.; O'Malley, R. E., Jr.

CONTRACT NO. DAAG29-82-K-0197, AFOSR-80-0192

MONITOR: ARO, AFOSR
19512.1-MA, TR-85-0830

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Scientific and Statistical Computation, v5 n4 p865-886 Dec 84.

ABSTRACT: (U) This document describes the development of numerical procedures for constructing asymptotic solutions of certain nonlinear singularly perturbed vector two-point boundary value problems having boundary layers at one or both endpoints. The asymptotic approximations are generated numerically and can either be used as is or to furnish a general purpose two-point boundary value code with an initial approximation and the nonuniform computational mesh needed for such problems. The procedures are applied to a model problem that has multiple solutions and to problems describing the deformation of a thin nonlinear elastic beam that is resting on an elastic foundation. Additional keywords: reprints; asymptotic series; beams(structural). (Author)

DESCRIPTORS: (U) *DEFORMATION, *BEAMS(STRUCTURAL), BOUNDARY VALUE PROBLEMS, ASYMPTOTIC SERIES, NUMERICAL METHODS AND PROCEDURES, STIFFNESS, REPRINTS

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