

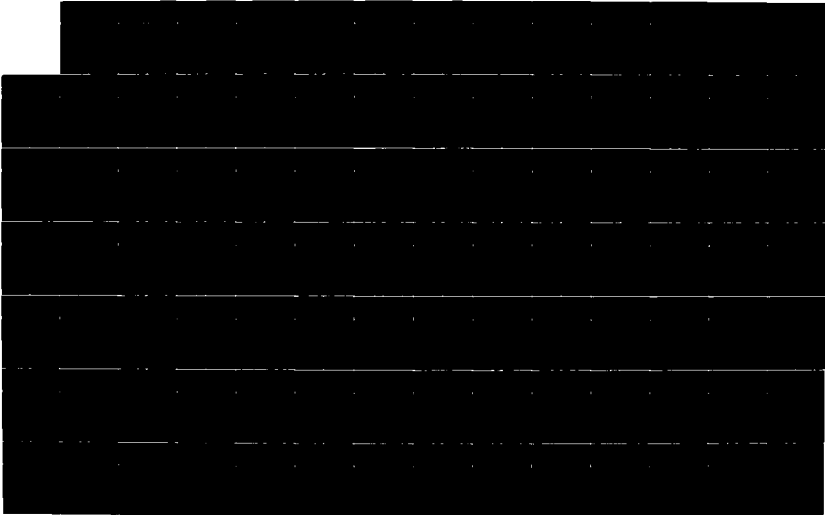
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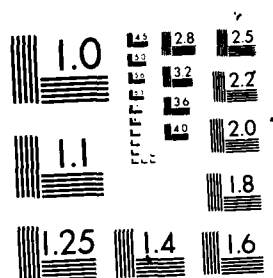
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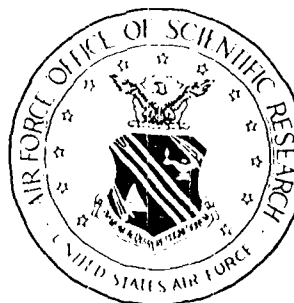
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AFOSR
TECHNICAL REPORT SUMMARIES
SECOND QUARTER 1986

PREPARED BY:
BARBARA WERT, CHIEF
TECHNICAL DOCUMENTS SECTION
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INTRODUCTION

AFOSR

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 *and*

- a. Subject Field
- b. Title of Report
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2) PERSONAL AUTHOR INDEX *are included.*

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PURPOSE

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

AFOSR MISSION

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.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from unsolicited proposals originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

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The summaries consist of two indexes and the abstracts. From one of the two indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field and the second number after the slash is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

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.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

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

Descriptors - Key words describing the research.

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The Meatgrinder Inductive Energy
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Using Distributed Rather Than
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ABSTRACTS

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AD-B100 404L 11/2

AD-B100 404L CONTINUED

FLORIDA UNIV GAINESVILLE DEPT OF MATERIALS SCIENCE AND
ENGINEERING

Composites. Project E: Electronic Behavior of SiC.

(U) Ultrastructure Processing and Environmental Stability
of Advanced Structural and Electronic Materials.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *MATRIX MATERIALS,
STRUCTURES, MATERIALS, BEHAVIOR, ELECTRONICS,
ENVIRONMENTS, SPACECRAFT, STABILITY, CONTROL, INTERFACES,
PREDICTIONS

DESCRIPTIVE NOTE: Final rept. 1 Apr 83-31 Mar 85.

IDENTIFIERS: (U) WUAFQSR2303A3, PE61102F

APR 85 440P

PERSONAL AUTHORS: Hench, L. L. ; Clark, D. E. ;

CONTRACT NO. F49620-83-C-0072

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86 0034

UNCLASSIFIED REPORT

Distribution limited to DoD only; Critical Technology; 5
Feb 86. Other requests must be referred to Air Force
Office of Scientific Research/XDT, Bldg. 410, Bolling AFB,
DC 20332.

ABSTRACT: (U) The goal of this program is to achieve an
understanding of the science of ultrastructure processing.
Ultrastructure processing refers to the manipulation and
control of interfaces to attain a new generation of high
performance materials with predictable properties and
environmental insensitivity. Problem areas to benefit
from ultrastructure processing include: large scale space
structures, advanced optical and opto-electronic systems,
controlled particulates, adhesion of fillers and
reinforcers in composites, corrosion of glasses ceramics,
fatigue of brittle materials, grain boundary attack of
ceramics, effects of energetic particle beams, lifetime
of non-oxide ceramics, electronic behavior of high band
gap semiconductors, multiphase electronic components.
Five projects are pursued: Project A: Sol-Gel Derived
Processing of Amorphous Matrices for Composites
Lightweight Assembled Structures for Space (CLASS).
Project B: Sol-Gel Derived Processing of Ceramic Matrix
CLASS Materials. Project C: Micromorphology Processing of
CLASS Materials. Project D: Processing of SiC and

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Water Solubility Behavior of Binary Hydrocarbon Mixtures.
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ENERGY COMPRESSION RESEARCH CORP DEL MAR CA

(U) The Meatgrinder Inductive Energy Storage and Transfer Technique Using Distributed Rather Than Lumped Parameters.

DESCRIPTIVE NOTE: Final rept. 24 May 84-25 Jul 85.

JUL 85 61P

PERSONAL AUTHORS: Zucker, Oved S.F.; Long, James R.; Lindner, Kenneth; Giorgi, David; Navapanich, Tajchai;

REPORT NO. ECR-AR10001

CONTRACT NO. F49620-84-C-0053

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-86-0154

Meatgrinder systems of predetermined performance from the results of codes 1) and 2). From the various computer codes, experimental plans for a Shiva-type load were designed and are presented as an appendix in this report. In addition the analysis resulted in the development of two new Explosive Generator concepts. (Author)

DESCRIPTORS: (U) *CIRCUIT ANALYSIS, *ENERGY STORAGE, *ELECTROMAGNETIC PULSE SIMULATORS, *ELECTROMAGNETIC INDUCTION, CONFIGURATIONS, EXTERNAL, TRANSFER SWITCHES, INDUCTANCE, CIRCUITS, COMPUTER PROGRAMS, MAGNETIC PROPERTIES, MODELS, PARALLEL ORIENTATION, ELECTRONIC SWITCHING, SEQUENCES, WORK, ENERGY TRANSFER

IDENTIFIERS: (U) Meatgrinder inductive energy storage, PE61102F, WUAF0SR2301A7

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Proprietary Info.; 3 Apr 86. Other requests must be referred to Air Force Office of Scientific Research, Attn: XOT, Bldg. 410, Bolling AFB, DC 20332.

ABSTRACT: (U) In the past few years, a number of inductive energy transfer schemes with varying inductance have been proposed. Until now, however, a study of the distributed nature of such systems has not been performed. In this report, results of such a study analyzing the theoretical behavior of circuits with mutual inductance undergoing a change of inductance due to continuous sequential switching are presented. The three types of circuits analyzed were series (Meatgrinder) configurations, parallel configurations, and circuits with sequential switching undergoing a change of geometry via external work. Computer codes were written to 1) calculate the distributed magnetic properties of a physical model of each circuit, 2) model circuits which incorporate distributed parameters from physical switching schemes to obtain dynamic performance of physical Meatgrinder systems, and 3) design physical

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AD-B100 301 CONTINUED

AEROSPACE CORP EL SEGUNDO CA ENGINEERING GROUP

(U) Advanced Carbon Materials for Space Applications.

DESCRIPTIVE NOTE: Final rept.,

AUG 85 77P

PERSONAL AUTHORS: Baker, R. L. ; Herr, K. C. ; Stone, D. K. ;
Coffer, J. E. ; Rockie, B. A. ;

REPORT NO. TOR-0084A(5651-01)-2

CONTRACT NO. FO4701-83-C-0084, AFOSR-MIPR-85-00010

PROJECT NO. 2306

TASK NO. C4

MONITOR: AFOSR
TR-86-0058

these properties on polymer crosslink density, molecular structure of the crosslink, the presence of fiber reinforcement, and heating rate during carbonization has been determined. Section IV discusses possible future directions for the AFOSR Spacecraft Survivability Program.

DESCRIPTORS: (U) CARBON, ABSORPTION, AMORPHOUS MATERIALS, CARBON CARBON COMPOSITES, CHARRING, COMPOSITE MATERIALS, CONVERSION, CROSSLINKING(CHEMISTRY), DENSITY, FIBER REINFORCEMENT, HARDNESS, HEATING, HIGH RATE, LASER BEAMS, LASERS, MATERIALS, MECHANICAL PROPERTIES, MOLECULAR STRUCTURE, PARTICULATES, POLYMERS, POROSITY, RATES, SPACE TECHNOLOGY, SPACECRAFT, SPECTROSCOPY, SURVIVABILITY, VACUUM, LASER DAMAGE, RADIATION HARDENING

IDENTIFIERS: (U) Laser hardening, PE61102F

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies and their contractors; Critical Technology; 19 Feb 86. Other requests must be referred to Air Force Office of Scientific Research/XDi, Building 410, Bolling AFB, DC 20332-6448.

ABSTRACT: (U) The work discussed in this report focuses on two aspects of carbon materials development work: a) improving the laser hardness of carbon materials, and b) modifying the resin matrix formulation of carbon composite materials to optimize the porosity and mechanical properties of the carbon char which is formed when they are heated. Spectroscopic techniques have been used to quantify the degree of probe beam blockage due to the existence of carbon particulates in laser-vaporized carbon plumes in a vacuum. The measured absorption (0.3) indicates that the potential for significant absorption of incoming laser radiation (and consequent improvements in laser hardness) by enhancing this mechanism is minimal. Several carbon/carbon, polycrystalline, and amorphous carbons were tested. The controlled porosity carbon char task has identified six polyarylacetylene polymer systems which give both the high char yield (> 80%) and the predominantly open porosity desired. The dependence of

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TEXAS TRANSPORTATION INST COLLEGE STATION

(U) Fracture in Stabilized Soils. Volume 1.

STRAIN(MECHANICS), TENSILE STRENGTH, FINE GRAINED
MATERIALS, STRESS ANALYSIS, KINETIC ENERGY, THERMAL
RADIATION, THICKNESS

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 82-31 Dec
85.

IDENTIFIERS: (U) Portland cement, PE61102F,
WUAFOSR2302C2

DEC 85 310P

PERSONAL AUTHORS: Little, D. N. ; Crockford, W. W. ; Kim, Y. ;

CONTRACT NO. F49620-82-K-0027

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR
TR-86-0242-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A167 106.

ABSTRACT: (U) Conventionally the thickness design of stabilized soil layers has been based upon the tensile strength of the stabilized soil layer and/or the appearance of the first crack. The design literature does not allow one to consider the true development of cracking in the stabilized soil layer. Knowledge of the mode of such crack could drastically alter the philosophy behind thickness design of layers. In this research the principles of theoretical fracture mechanics are used to explain the mode and mechanism of fracture in fine grained media stabilized with portland cement. Experimental fracture mechanics is used to validate or verify and in some cases to investigate more fully the hypothesized mechanisms of fracture. The influence of osmotic and matrix soil section, temperature, binder content, thermal and kinetic energy, from sources outside the crack, are considered in the study. Linear elastic fracture mechanics is proven to be a highly acceptable analytical tool for these materials. Keywords: Fracture mechanics; Stress analysis; Strain mechanics.

DESCRIPTORS: (U) *SOIL MECHANICS, *FRACTURE(MECHANICS), *SOIL STABILIZATION, BINDERS, CEMENTS, CRACKS, ELASTIC PROPERTIES, LINEARITY, LAYERS, SOILS, STABILIZATION,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A168 263 20/5

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF PHYSICS

(U) Equipment for Subpicosecond Extreme Ultraviolet Facility.

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

FEB 86 141P

PERSONAL AUTHORS: Rhodes, Charles K. ; Boyer, Keith ; Luk, Tsing Shan ;

CONTRACT NO. AFOSR-84-0289

PROJECT NO. 2917

TASK NO. A6

MONITOR: AFOSR
TR-86-0281

UNCLASSIFIED REPORT

ABSTRACT: (U) The research program underway at the University of Illinois at Chicago, whose main goal is the development of coherent x-ray sources in the kilovolt range, is described. The new femtosecond source developed under the equipment grant provided by the Air Force has been placed in operation. Keywords included: Ultraviolet and x-ray lasers.

DESCRIPTORS: (U) *ULTRAVIOLET LASERS, *EXCIMER, COHERENCE, SOURCES, FAR ULTRAVIOLET RADIATION, SOFT X RAYS, PUMPING (ELECTRONICS), QUANTUM ELECTRONICS

IDENTIFIERS: (U) *X ray lasers, Femtosecond time, Krypton fluoride lasers, WUAFOSR2917A6, PEG1102F

AD-A168 127 9/2

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Parallel Logic Programming and ZMOB and Parallel Systems Software and Hardware.

DESCRIPTIVE NOTE: Final rept. 10 Oct 84-11 Jan 85,

DEC 85 12P

PERSONAL AUTHORS: Minker, Jack ; Weiser, Mark ;

PROJECT NO. 2304

TASK NO. K1

MONITOR: AFOSR
TR-86-0220

UNCLASSIFIED REPORT

ABSTRACT: (U) The initial version of PRISM uses a simulation of the ZMOB hardware, and has been fully tested and debugged. In addition, several enhancements were made to PRISM to permit experimental analyses to be made, and to incorporate additional features to take full advantage of parallelism in a problem solving environment. Tracing and a statistical gathering package were added to permit experimental analysis. An AND-parallelism capability was added to achieve a second version of the PRISM system, and other features were added to the system to more fully exploit parallelism. Preliminary application and evaluation studies were performed. In the area of systems hardware and software, the ZMOB processor is now fully functional and in everyday use with 128 processors. Work is continuing on an experimental upgrade of some of ZMOB's processors to 68000s. Basic system software for multiprocessing on ZMOB is becoming more robust and performance studies now pinpoint areas for improvement. Studies of parallel software debugging continue to prove the value of multiple program views, and in particular the dicing approach was verified in a controlled experiment. We have also constructed an interactive visual slicer. Studies of the automatic parallelization of programs continues. We can now slice/splice arbitrarily structured programs and have techniques that significantly reduce information overhead between the slices and the splicer. (Author)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A168 127 CONTINUED

DESCRIPTORS: (U) *PARALLEL PROCESSING, *SYSTEMS
ENGINEERING, COMPUTER PROGRAMS, DEBUGGING(COMPUTERS),
ENVIRONMENTS, MULTIPROCESSORS, PROBLEM SOLVING, COMPUTER
LOGIC

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K1

AD-A167 777 3/3 17/9

MICHIGAN UNIV ANN ARBOR DEPT OF PHYSICS

(U) A Sensitive Radar Search for Small Natural Satellites
of the Earth.

DESCRIPTIVE NOTE: Final rept. 15 May 83-14 Jul 85,

SEP 85 17P

PERSONAL AUTHORS: Longo, Michael J. ;

CONTRACT NO. AFOSR-83-0128

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-86-0238

UNCLASSIFIED REPORT

ABSTRACT: (U) We have used radar tracking data from
NORAD to perform a sensitive search for small natural
satellites of the Earth. This search would be sensitive
to satellites ranging from 5 cm in diameter with perigee
heights 400 km to about 40 cm with perigees 10000 km.
While a few unidentified objects were found, these were
all near transfer orbits likely to contain debris from
satellite launches. No objects that are unlikely to be
manmade were seen. Keywords include: Search for Natural
Satellites of Earth; Radar; and Satellite search.

DESCRIPTORS: (U) *PLANETARY SATELLITES, *RADAR TRACKING,
*SEARCH RADAR, TRANSFER, RADAR, SENSITIVITY, EARTH(PLANET)
, SEARCHING, SIZES(DIMENSIONS), RANGE(DISTANCE), EARTH
ORBITS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 724 20/12

AD-A167 724 CONTINUED

CORNELL UNIV ITHACA NY

IDENTIFIERS: (U) Drude theory, PE61102F

(U) Experimental Study of Electronic States at Metal-Dielectric Interfaces.

DESCRIPTIVE NOTE: Interim Technical rept. 2 Feb 83-31 May 84.

DEC 85 16P

PERSONAL AUTHORS: Sievers, A. J. ;

CONTRACT NO. AFOSR-81-0121

PROJECT NO. 2306

TASK NO. 82

MONITOR: AFOSR
TR-86-0075

UNCLASSIFIED REPORT

ABSTRACT: (U) The method of attenuated total reflection has been used in the visible region to obtain precise values of the dielectric function of Ag films in contact with different dielectric media. By measuring, at eight visible laser wavelengths, the surface-plasmon resonance of an Ag film against air and then against an organic liquid, we show that for both cases the dielectric function can be described by the Drude model with the well-known frequency-dependent relaxation time. The observed change in the frequency dependent parameters appears to eliminate all previous models which have been proposed to describe this frequency dependent relaxation time. The observed changes are consistent with the idea of a complex relaxation time whose real and imaginary parts are connected in a casual way. The index-of-refraction dependence of the Drude parameters demonstrates that surface electrodynamics must play an important role. (Author)

DESCRIPTORS: (U) *PLASMONS, *METAL FILMS, *DIELECTRICS, *INTERFACES, SILVER, REFRACTIVE INDEX, INTERNAL REFLECTION, RELAXATION TIME, MEDIA, FREQUENCY, PARAMETERS, COMPLEX NUMBERS, LASERS, VISIBLE SPECTRA, DIELECTRIC PROPERTIES, ELECTRONIC STATES, ELECTRODYNAMICS, SURFACES

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 684 12/1

AD-A167 684 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Time Evolution via a Self-Consistent Maximal-Entropy
Propagation. The Reversible Case,

SEP 84 15P

PERSONAL AUTHORS: Tishby, N. Z. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0187

FORMULATIONS, HAMILTONIAN FUNCTIONS, MEAN, OSCILLATORS,
PERTURBATIONS, PROPAGATION, REPRINTS, REVERSIBLE, TIME,
TIME DEPENDENCE, LIE GROUPS, OPERATORS(MATHEMATICS)

IDENTIFIERS: (U) Maximum entropy method, Morse
oscillators. PEG1102F, WUAFOSR2303B1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v30 n3
p1477-1490 Sep 84.

ABSTRACT: (U) A practical approach to the description of
time evolution via the mean values of a set of a few
relevant observables is discussed. The mean values
determine, in a self-consistent way, the time propagation
of the system. The procedure yields variational
formulation, through which closed-form equations of
motion of Hamiltonian form are derived for the relevant
mean values. The approximation can provide an exact
description under well defined conditions. The time
evolution is reversible in that the entropy does not
increase and can be described by a unitary evolution
operator. A special case of both practical and formal
importance is when the relevant observables form a Lie
algebra. The self consistency conditions can then be
explicitly implemented and a symplectic structure can be
provided for the reduced phase space. Time displacements
(of either the state or the observables) can then be
described by a self-consistent Hamiltonian, linear in the
generators. An example of corresponding to the evolution
of a Morse type oscillator under a time dependent
external perturbation is discussed in detail. Keywords:
Reprints; Time evolution; Entropy propagation.

DESCRIPTORS: (U) *ENTROPY, *VARIATIONAL PRINCIPLES,
CONSISTENCY, DISPLACEMENT, EVOLUTION(GENERAL), EXTERNAL,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 584 12/1

AD-A167 584 CONTINUED

SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND STATISTICS

models; Multiple comparisons; Accelerated life testing.

(U) Nonparametric Estimation of Quantiles and of Density Functions under Censoring, Discrete Failure Models and Multiple Comparisons.

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, MATHEMATICAL MODELS, DISTRIBUTION FUNCTIONS, ACCELERATED TESTING, LIFE TESTS, DENSITY, FAILURE, OPTIMIZATION, CONFIDENCE LIMITS, INTERVALS, SYNCHRONISM, MODELS, PARAMETRIC ANALYSIS

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

IDENTIFIERS: (U) *Quantiles, PE61102F, WUAFOSR2305A5

JUN 85 13P

PERSONAL AUTHORS: Padgett, W. J. ; Spurrier, J. D. ;

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0174

UNCLASSIFIED REPORT

ABSTRACT: (U) Major results have been obtained in the areas of nonparametric estimation of quantiles and of density functions under censoring, discrete failure models, and multiple comparisons. In particular, smooth nonparametric estimators of quantile functions from censored data were developed which give better estimates of percentiles of the lifetime distribution than the usual product-limit quantile function. Also, smooth density estimators from censored data were investigated using maximum penalized likelihood procedures. Several parametric models were proposed for the case of discrete failure data. These models provide a better fit to such data than some previously used discrete models. Finally, new methods of constructing simultaneous confidence intervals for pairwise differences of means of normal populations were developed, and the problem of selecting an asymptotically optimal design for comparing several new treatments with a control was solved. Work is continuing on the study of properties of kernel type quantile function estimators and development of goodness-of-fit tests for the model assumptions in accelerated life testing. Keywords: Nonparametric quantile estimation; Density estimation; Right-censored data; Discrete failure

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AD-A167 563 6/20 6/3 6/18
CALIFORNIA UNIV SAN FRANCISCO CARDIOVASCULAR RESEARCH
INST

AD-A167 563 CONTINUED

LEVEL, MOLECULES, POLYMERS, RADIATION DOSAGE, RADIATION
EFFECTS, TOXICITY, TOXINS AND ANTITOXINS, CELLS(BIOLOGY)

(U) Molecular Toxicology of Chromatin: The Role of Poly
(ADP-Ribose) in Gene Control.

IDENTIFIERS: (U) ADP(Adenosine diphosphate), Phenotype,
PE61102F, WUAFQSR2312A5

DESCRIPTIVE NOTE: Final rept. Jan-Dec 85.

DEC 85 118P

PERSONAL AUTHORS: Kun, Ernest ;

CONTRACT NO. F49620-81-C-0007

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-86-0223

UNCLASSIFIED REPORT

ABSTRACT: (U) This research endeavor approaches
'chromatin toxicity' in a selective manner. Environmental
factors (both physical and chemical) exert a subtle long-
term effect on cellular systems, that is distinguishable
from the acute lethal effects of toxins or high doses of
radiation. We focus our attention on the effect of 'low-
dose' toxicology which affects cellular behavior and
alters cellular phenotype. Present concepts define the
molecular basis of cellular phenotype as a carefully and
specifically orchestrated composite of gene-expressions,
which contain both the determinants of cellular phenotype
and life expectancies of specific cell types. Notably,
chemical or radiation effects will inevitably result in
cellular phenotypic changes, the most pervasive being
malignancy. The specific experimental approach commenced
with the study of the nuclear polymer (ADP-ribose)N,
which we predicted could lead to a more basic
understanding of gene regulations (proto-oncogene and
differentiation regulation being the defined field).
Keywords: Antitransformation.

DESCRIPTORS: (U) *TOXICOLOGY, *CHROMATIN, *GENES,
*MOLECULAR BIOLOGY, *ADENOSINE PHOSPHATES, *RIBOSE,
CANCER, CHEMICALS, CONTROL, CYTOLOGY, DOSAGE, DOSE RATE,
ENVIRONMENTS, HIGH RATE, LETHALITY, LONG RANGE(TIME), LOW

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 561 13/8

BROWN UNIV PROVIDENCE RI LEFSCHEZ CENTER FOR DYNAMICAL SYSTEMS

(U) Turnpike Set in Optimal Stochastic Production Planning Problems.

DESCRIPTIVE NOTE: Interim rept.,

JAN 86 77P

PERSONAL AUTHORS: Fleming, Wendell H. ; Sethi, Suresh P. ; Soner, Halil M. ;

REPORT NO. LCDS-86-2

CONTRACT NO. AFOSR-81-0116

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0256

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-MCS81-21940.

ABSTRACT: (U) This paper considers an infinite horizon stochastic production planning problem with demand assumed to be a continuous-time Markov process. The problems with control (production) and state (inventory) constraints are treated. It is shown that a unique optimal feedback solution exists. The solution is characterized in terms of a turnpike set, toward which the optimal inventory level approach monotonically over time. Moreover, for nondeterministic demand the optimal inventory level reaches the turnpike set almost surely in a finite time and, thereafter, it wanders inside the set in response to the randomly fluctuating demand. Keywords: Stochastic optimal control. (Author)

DESCRIPTORS: (U) *PRODUCTION CONTROL, *STOCHASTIC CONTROL, APPLIED MATHEMATICS, INVENTORY, OPTIMIZATION, FEEDBACK, SOLUTIONS(GENERAL), CONTROL

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

AD-A167 561

AD-A167 558 11/5 11/9

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) Structure Formation during Spinning of Poly(p-phenylenebenzobisthiazole) Fiber,

DEC 85 5P

PERSONAL AUTHORS: Cohen, Y. ; Thomas, E. L. ;

CONTRACT NO. F33615-82-K-5068, AFOSR-85-0275

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0251

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Engineering and Science, v25 n17 p1093-1097 Dec 85.

ABSTRACT: (U) High performance fibers obtained from lyotropic solutions of rigid polymers by the dry-jet wet spinning process have been a subject of much interest due to their excellent mechanical properties. The fiber spinning process involves several operations in which a polymer solution undergoes a succession of structural changes, solid fiber. In the coagulation stage, a liquid to solid phase transition is induced, either by diffusion of a non-solvent or by a decrease in temperature. Poly(p-phenylenebenzobisthiazole) (PBT) is a rigid polymer from which high modulus, high strength fibers are spun. The structure formed in the coagulation stage of spinning process of poly(p-phenylene benzobisthiazole) fiber is studied by electron microscopy. An oriented network of microfibrils with typical fibril diameters of about 80-100 Å is observed. We suggest that these microfibrils are the fundamental structural elements of the fiber. Thus, knowledge of the mechanism by which this initial structure is formed may allow for better control of final fiber properties. The relation of structure formation during coagulation to the phase diagram of a rigid polymer solution and to the kinetic mechanisms of the phase transition is discussed.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 558 CONTINUED

DESCRIPTORS: (U) *SPINNING(INDUSTRIAL PROCESSES),
*SYNTHETIC FIBERS, COAGULATION, ELECTRON MICROSCOPY,
FIBERS, HIGH STRENGTH, KINETICS, MECHANICAL PROPERTIES,
NETWORKS, PHASE DIAGRAMS, PHASE TRANSFORMATIONS, POLYMERS,
RIGIDITY, SOLID PHASES, SOLIDS, SOLUTIONS(GENERAL),
STRUCTURAL MEMBERS, STRUCTURAL PROPERTIES, THIAZOLES,
POLYPHENYLENES, SOLUTIONS(MIXTURES), REPRINTS

IDENTIFIERS: (U) PBT(Phenylenebenzobisthiazole),
WUAFOSR2303A3, PE61102F

AD-A167 436 5/9 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer
Support Program (1985). Management Report.

DESCRIPTIVE NOTE: Annual rept.,

DEC 85 186P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86-0135

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A167 434 and
Volume 2, AD-A167 435.

ABSTRACT: (U) The Graduate Student Summer Support
Program (GSSSP) is conducted as part of the Summer
Faculty Research Program. The program provides
opportunities for research in the physical sciences,
engineering, life sciences, business, and administrative
sciences. The program has been effective in providing
basic research opportunities to the Graduate Students of
universities, colleges, and technical institutions
throughout the United States. The program is available to
Graduate Students enrolled in either Masters Degree or
Doctorate Programs. It has proven especially beneficial
to the students who are starting their academic research
programs. Beginning with the 1982 program, research
opportunities were provided for 17 graduate students. The
1982 pilot student program was highly successful and was
expanded in 1983 to 53 students; there were 84 graduate
students in the 1984 program. In the previous programs,
the graduate students were selected along with their
professors to work on the program. For the 1985 program,
the graduate students were selected on their own merits.
They were assigned to be supervised by either a professor
on the program or by an engineer at the Air Force
Laboratories participating in the program. There were 92

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 436 CONTINUED

graduate students selected for the 1985 program. Its purpose is to provide funds for selected graduate students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, *UNIVERSITIES, *AIR FORCE PERSONNEL, AIR FORCE FACILITIES, INSTRUCTORS, LABORATORIES, LIFE SCIENCES, MANAGEMENT, PHYSICAL SCIENCES, STUDENTS, SUMMER, UNITED STATES, WORK

IDENTIFIERS: (U) PER1102F

AD-A167 435 5/9 5/3 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer Support Program (1985). Technical Report. Volume 2.

DESCRIPTIVE NOTE: Annual rept.,

DEC 85 1050P

PERSONAL AUTHORS: Darrah, Rodney C.; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86-0137

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A167 434 and Management Report, AD-A167 436.

ABSTRACT: (U) The U.S. AF Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the U.S. AF Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate AF Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising AF Engineer. This is accomplished by the students being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at AF laboratories/centers. Each assignment is in a subject area and at an Air Force facility mutually agreed upon by the students and the AF. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1985 USAF-GSSSP are: (1) To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; (2) To simulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To enhance the research productivity and capabilities of the graduate students especially as these

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 558 CONTINUED

DESCRIPTORS: (U) *SPINNING(INDUSTRIAL PROCESSES),
*SYNTHETIC FIBERS, COAGULATION, ELECTRON MICROSCOPY,
FIBERS, HIGH STRENGTH, KINETICS, MECHANICAL PROPERTIES,
NETWORKS, PHASE DIAGRAMS, PHASE TRANSFORMATIONS, POLYMERS,
RIGIDITY, SOLID PHASES, SOLIDS, SOLUTIONS(GENERAL),
STRUCTURAL MEMBERS, STRUCTURAL PROPERTIES, THIAZOLES,
POLYPHENYLENES, SOLUTIONS(MIXTURES), REPRINTS

IDENTIFIERS: (U) PBT(Phenylenebenzobisthiazole),
WUAFOSR2303A3, PE61'02F

AD-A167 436 5/9 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer
Support Program (1985). Management Report.

DESCRIPTIVE NOTE: Annual rept..

DEC 85 186P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSP
TR-86-0135

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A167 434 and
Volume 2, AD-A167 435.

ABSTRACT: (U) The Graduate Student Summer Support
Program (GSSSP) is conducted as part of the Summer
Faculty Research Program. The program provides
opportunities for research in the physical sciences,
engineering, life sciences, business, and administrative
sciences. The program has been effective in providing
basic research opportunities to the Graduate Students of
universities, colleges, and technical institutions
throughout the United States. The program is available to
Graduate Students enrolled in either Masters Degree or
Doctorate Programs. It has proven especially beneficial
to the students who are starting their academic research
programs. Beginning with the 1982 program, research
opportunities were provided for 17 graduate students. The
1982 pilot student program was highly successful and was
expanded in 1983 to 53 students; there were 84 graduate
students in the 1984 program. In the previous programs,
the graduate students were selected along with their
professors to work on the program. For the 1985 program,
the graduate students were selected on their own merits.
They were assigned to be supervised by either a professor
on the program or by an engineer at the Air Force
Laboratories participating in the program. There were 92

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 436 CONTINUED

graduate students selected for the 1985 program. Its purpose is to provide funds for selected graduate students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, *UNIVERSITIES, *AIR FORCE PERSONNEL, AIR FORCE FACILITIES, INSTRUCTORS, LABORATORIES, LIFE SCIENCES, MANAGEMENT, PHYSICAL SCIENCES, STUDENTS, SUMMER, UNITED STATES, WORK

IDENTIFIERS: (U) PE61102F

AD-A167 435 5/9 5/3 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer Support Program (1985). Technical Report. Volume 2

DESCRIPTIVE NOTE: Annual rept..

DEC 85 1050P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86-0137

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A167 434 and Management Report, AD-A167 436.

ABSTRACT: (U) The U.S. AF Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the U.S. AF Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate AF Facility with a supervising professor or holds a concurrent Summer Faculty Research Program appointment or with a supervising AF Engineer. This is accomplished by the students being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at AF laboratories/centers. Each assignment is in a subject area and at an Air Force facility mutually agreed upon by the students and the In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of 1985 USAF-GSSSP are: (1) To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; (2) To simulate continuing professional association among the scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To enhance the research productivity and capabilities of the graduate students especially as to

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 435 CONTINUED

relate to Air Force technical interests.

DESCRIPTORS: (U) *SALARIES, *AIR FORCE PERSONNEL, *JOBS, *BENEFITS, ADDITION, AIR FORCE, AIR FORCE FACILITIES, COMPENSATION, INSTRUCTORS, LABORATORIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, STUDENTS, SUMMER, WORK, GRADUATES, MANAGEMENT PLANNING AND CONTROL

IDENTIFIERS: (U) PEB1102F

AD-A167 434 5/9 5/3 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer Support Program (1985). Technical Report. Volume 1.

DESCRIPTIVE NOTE: Annual rept.,

DEC 85 1128P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86-0136

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2. AD-A167 435 and Management Report. AD-A167 436.

ABSTRACT: (U) The U.S. AF Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the U.S. AF Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate AF Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising AF Engineer. This is accomplished by the students being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at AF laboratories/centers. Each assignment is in a subject area and at an Air Force facility mutually agreed upon by the students and the AF. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1985 USAF-GSSSP are: (1) To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; (2) To simulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To enhance the research productivity and capabilities of the graduate students especially as the

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relate to Air Force technical interests.

DESCRIPTORS: (U) *SALARIES, *AIR FORCE PERSONNEL, *JOBS, *BENEFITS, ADDITION, AIR FORCE, AIR FORCE FACILITIES, COMPENSATION, INSTRUCTORS, LABORATORIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, STUDENTS, SUMMER, WORK, GRADUATES, MANAGEMENT PLANNING AND CONTROL

IDENTIFIERS: (U) PE61102F

AD-A167 353 20/8 7/4 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Potential Energy Surfaces for Stable Triatomic Molecules Using an Algebraic Hamiltonian,

JUN 85 8P

PERSONAL AUTHORS: Levine, R. D.; Benjamin, I. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0197

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v117 n4 p314-320, 21 Jun 85.

ABSTRACT: (U) A coordinate representation for a potential energy surface is derived using the semiclassical limit of the algebraic Hamiltonian. This provides a direct route from the observed overtone spectrum to a potential. The limitations of this potential are noted. Applications to HCN, H2O, SO2 and O3 are reported. Keywords: Energy surfaces; Stable triatomic molecules; Reprints; Hydrogen Cyanide; Water; Sulfur Dioxide; Ozone.

DESCRIPTORS: (U) *POTENTIAL ENERGY, *POLYATOMIC MOLECULES, *SURFACE ENERGY, ALGEBRA, COORDINATES, DIOXIDES, ENERGY, HAMILTONIAN FUNCTIONS, HYDROGEN CYANIDE, OZONE, REPRINTS, STABILITY, SULFUR OXIDES, SURFACES, WATER

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

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AD-A167 352 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Maximum-Entropy Analysis of Heavy-Ion Transfer Reactions and the Exciton Model.

MAY 83 5P

PERSONAL AUTHORS: Levine, R. D. ;

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0183

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics Letters, v124B, n6
p461-464, 12 May 83.

ABSTRACT: (U) We clarify the concept of the prior distribution with special reference to the exciton model and apply it to energy disposal in heavy ion transfer reactions. The exciton model does not 'inspire a different for the prior distribution'. The prior distribution reflects only the strict conservation laws and is thus independent of any model assumptions. It arises because of the practical consideration that what is measured is seldom the distribution in a final quantum state. Rather it is a distribution of a lower resolution. The role of models is in choosing the constraints responsible for the deviations from the prior limit. Model which give rise to the same constraints are thus equivalent. Keywords: Reprints; Entropy analysis.

DESCRIPTORS: (U) *EXCITONS, *TRANSFER FUNCTIONS, CONSERVATION, ENERGY, ENTROPY, HEAVY IONS, LOW RESOLUTION, MODELS, QUANTUM THEORY, REPRINTS, ENERGY TRANSFER

IDENTIFIERS: (U) Maximum entropy estimation, PE61102F, WUAFOSR2303B1

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AD-A167 350 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Opacity Analysis of Steric Requirements in Elementary Chemical Reactions.

MAR 84 6P

PERSONAL AUTHORS: Levine, R. D. ; Bernstein, R. B. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0189

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v105 n5 p467-471, 30 Mar 84.

ABSTRACT: (U) With the advent of more extensive experiments on oriented molecule reactions, it is desirable to develop appropriate theoretical techniques for their interpretation. As a preliminary step in this direction, it seems reasonable to examine simpler models of the type that have well served molecular reaction dynamics since the early days. Specifically, we wish to generalize the venerable line-of-centers model (5-7) by incorporating in the model the dependence of the barrier to reaction upon the mutual orientation of the reagents. Our approach makes use of some of the qualitative ideas of Karplus et al. On the steric requirements of a reaction. The orientation dependence of the barrier to reaction is incorporated into the classical line-of-centers model to obtain the dependence of the cone of acceptance upon impact parameter and collision energy. Simple expressions for the orientation-averaged opacity function, the reaction cross section and the steric factor are derived. Comparison is made with recent classical trajectory calculations by Blais and Truhlar for the H+ D2 reaction.

DESCRIPTORS: (U) *OPACITY, *CHEMICAL REACTIONS, *MOLECULAR PROPERTIES, *STEREOCHEMISTRY, BARRIERS, COLLISIONS, COMPUTATIONS, CROSS SECTIONS, DYNAMICS.

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SEARCH CONTROL NO. EVK55I

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ENERGY, IMPACT, MODELS, MOLECULES, ORIENTATION(DIRECTION),
PARAMETERS, RESPONSE, TRAJECTORIES, MOLECULAR STRUCTURE,
MOLECULE MOLECULE INTERACTIONS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A167 349 20/8 7/4 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Information Content Analysis for Reactions of Oriented
Molecules.

84 6P

PERSONAL AUTHORS: Engel, Y. M. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0191

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics, v91 p167-
171 1984.

ABSTRACT: (U) Reactivity of oriented reagents and the
formation of polarized products are receiving increasing
attention. The results of such experiments are typically
represented as a series expansion in Legendre polynomials.
Here we raise the question is that the most compact
representation of such data or, another way, are the
Legendre expansion coefficients independent pieces of
data. Our conclusion is that an information theoretic
representation is more economical and, possibly, even
more useful. Experimental data on the orientation
dependence of the reactivity in $\text{NO} + \text{O}_3$ and $\text{Rb} + \text{CH}_3\text{I}$
collision is analyzed. Error limits of the measurements
are used to conclude that one, low-order, or Legendre
moment accounts for much of the observed dependence on
the orientation. The same procedure applies also to data
on the polarization of the products. Keywords: Anisotropy;
Curve fitting.

DESCRIPTORS: (U) *MOLECULE MOLECULE INTERACTIONS,
*MOLECULAR STRUCTURE, *LEGENDRE FUNCTIONS, ANISOTROPY,
CURVE FITTING, ERRORS, EXPANSION, INFORMATION THEORY,
LIMITATIONS, MOLECULES, ORIENTATION(DIRECTION),
POLARIZATION, POLYNOMIALS, SERIES(MATHEMATICS),
COEFFICIENTS, OZONE, NITROGEN OXIDES, RUBIDIUM, METHYL
RADICALS, IODIDES, COLLISIONS, ISRAEL

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 345 12/1
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS
(U) Exponential Bounds of Mean Error for the Kernel
Estimates of Regression Functions.

DESCRIPTIVE NOTE: Technical rept.,

DEC 85 19P

PERSONAL AUTHORS: Zhao, L. C. ;

REPORT NO. TR-85-50

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0255

UNCLASSIFIED REPORT

ABSTRACT: (U) Let (X, Y) , $(X_{\text{sub } 1}, Y_{\text{sub } 1}), \dots, (X_{\text{sub } n}, Y_{\text{sub } n})$ be i.i.d. R sub $L \times R$ -valued random vectors with $E/Y/e$ infinity, and let $Q_{\text{sub } n}$ be a kernel estimate of the regression function $Q(x) = E(Y/X = x)$. This paper establishes an exponential bound of the mean deviation between $Q_{\text{sub } n}$ and $Q(x)$ given the training sample $Z_{\text{sub } n} = (X_{\text{sub } 1}, Y_{\text{sub } 1}), \dots, (X_{\text{sub } n}, Y_{\text{sub } n})$, under the conditions as weak as possible. (Author)

DESCRIPTORS: (U) *EXPONENTIAL FUNCTIONS, *KERNEL FUNCTIONS, *REGRESSION ANALYSIS, ESTIMATES, ERRORS, MEAN

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A167 323 20/5 7/4
VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Kinetics of I(2) Following ArF Laser Excitation:
Thermal Dissociation of the $A'(2u)$ State.

84 5P

PERSONAL AUTHORS: Tellinghuisen, Joel ; Whyte, Andrew R. ;
Phillips, Leon F. ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0209

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry,
v88 n25 p6084-6087 1984.

ABSTRACT: (U) The quenching of the lowest excited state of I2 by I2, Ar, and N2 is studied by a delayed absorption probe technique following excimer laser photolysis. The resulting rate constants (units cc/s; T = 296 + or -3 K) are $k_{\text{sub } I2} = 8.3 (1.0) \times 10$ to the -11th power, $k_{\text{sub } Ar} = 2.8 (2) \times 10$ to the -14th power, and $k_{\text{sub } N2} = 7.2 (7) \times 10$ to the -14th power. The latter two are interpreted as thermal dissociation, but the I2 self-quenching is tentatively ascribed to the process $I2(A) + I2 \text{ yields } I3 + I$. Keywords: Laser photolysis; Absorption; Thermal excimer; Quenching; Reprints; Iodine; Nitrogen; Argon; Argon fluoride lasers.

DESCRIPTORS: (U) *IODINE, *PHOTOLYSIS, *EXCIMERS, *DISSOCIATION, *LASER PUMPING, ARGON, CONSTANTS, EXCITATION, LASERS, NITROGEN, RATES, REPRINTS, THERMAL PROPERTIES, RADIATION ABSORPTION, QUENCHING (INHIBITION)

IDENTIFIERS: (U) Argon fluoride lasers, PE61102F,
WUAFOSR2303B1

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AD-A167 322 7/4 20/10

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) D' Yields 2(u) (3 Delta) Transition in I(2) Analysis
by Classical and Quantum Spectral Simulations,

83 5P

PERSONAL AUTHORS: Tellinghuisen, Joel ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0207

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry,
v87 n25 p5136-5140 1983.

ABSTRACT: (U) The broad band near 5100 A in the emission
spectrum of I2 in Ar accounts fr 8% of the total emission
in the high-pressure limit. This band, previously
assigned as D sub g yields (2332)2 sub u(3 Delta), is
analyzed by spectral simulations to obtain the potential
curve for the 2 sub u state. The latter, which correlates
with I(2P3/2) + I(2P1/2), possess a bound well about 300/
cm deep. For this transition classical and quantum
methods yield virtually identical computed spectra.
Keywords: Reprints; Iodine; Analysis Classical Quantum
Spectral Simulations; High Pressure Emission.

DESCRIPTORS: (U) *IODINE, *QUANTUM THEORY, *EMISSION
SPECTRA, EMISSION, GRAPHS, HIGH PRESSURE, LIMITATIONS,
REPRINTS, SIMULATION, ELECTRON TRANSITIONS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A167 318 9/4 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Signal Processing Using Model Selection Methods.

JAN 86 20P

PERSONAL AUTHORS: Bai, Z. D. ; Krishnaiah, P. R. ; Zhao, L.
;

REPORT NO. TR-86-03

CONTRACT NO. N00014-85-K-0292, F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0253

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors gave a review
of some recent developments on multivariate statistical
techniques for detection of the number of signals using
eigenvalues. The main emphasis of the review is on
EFFICIENT DETECTION CRITERION (EDC) procedures proposed
by the authors recently. These procedures are strongly
consistent. Keywords include: Signal processing;
Eigenvalues, Additive model, Strong consistency,
Information theoretic criteria.

DESCRIPTORS: (U) *INFORMATION THEORY, *SIGNAL PROCESS
*MULTIVARIATE ANALYSIS, *STATISTICAL PROCESSES, ADDIT
CONSISTENCY, DETECTION, EIGENVALUES, MODELS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 306 11/6 20/12
AUBURN UNIV ALA DEPT OF PHYSICS

(U) Semiconductor Alloy Theory.

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

JAN 86 38P

PERSONAL AUTHORS: Chen, An-Ban ;

CONTRACT NO. AFOSR-84-0282

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-86-0160

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant supported our work on semiconductor alloy theory. Many useful results have been obtained, including: (1) generalization of Brooks' formula for alloy-scattering limited electron mobility to including multiple bands and indirect gaps, (2) calculation of SiGe alloys band structure, electron-mobility and core-exciton binding energy and linewidth, (3) comprehensive calculation of bond energy, bond length and mixing enthalpy for all III-V and II-VI pseudo-binary alloys, (4) development of a statistical theory which shows a non-random distribution of atoms in most alloys, (5) studying the sensitivity of defect levels to band structures and impurity potentials, (6) a study of the dipolar contribution to the mixing energy and its implication to the long-range order in alloys, e.g., GaAlAs, and (7) a model which allows a simple but detailed calculation of alloy band-edge properties.

DESCRIPTORS: (U) *ALLOYS, *SEMICONDUCTORS, SILICON ALLOYS, GERMANIUM ALLOYS, ALUMINUM GALLIUM ARSENIDE, SCATTERING, ELECTRON MOBILITY, ENERGY BANDS, BINARY ALLOYS, GROUP III COMPOUNDS, GROUP V COMPOUNDS, CHEMICAL BONDS, ENERGY, DEFECTS (MATERIALS), MIXING, THEORY, COMPUTATIONS, ENTHALPY, STATISTICS

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Overtone Spectrum in Terms of Normal or of Equivalent Modes with Application to H2O.

NOV 83 7P

PERSONAL AUTHORS: Benjamin, I. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0186

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters. v101 n6 p518-523. 4 Nov 83.

ABSTRACT: (U) An algebraic hamiltonian which closely fits the (low and) high stretching vibrational spectrum of H2O (and of other YXY molecules such as O3) is shown to correspond to two weakly coupled equivalent modes. The purpose of this letter is to show that an algebraic hamiltonian with a few (six) parameters can provide a close fit to the observed (non-bending) vibrational term values, up to the limit of available results. Central to the discussion is the Darling-Dennison coupling between the overtones of the symmetric and antisymmetric anharmonic normal model of YXY molecules. Section 2 is a review of the algebraic approach for a one-dimensional anharmonic oscillator. The transformation of the algebraic generators form the equivalent to the normal modes is introduced in section 3. The hamiltonian itself, with special reference to a new form for the cross anharmonicity term between anharmonic normal model is discussed in section 4. Results for the water spectrum are given in section 5. The hamiltonian is rewritten in terms of the generators of the equivalent modes in section 6. It is found that for special values of the coupling constants the equivalent modes are only very weakly coupled.

DESCRIPTORS: (U) *MOLECULAR VIBRATION, *EMISSION SPECTRA.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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*HAMILTONIAN FUNCTIONS, *ANHARMONIC OSCILLATORS, SYMMETRY, ALGEBRA, GENERATORS, CONSTANTS, COUPLING(INTERACTION), MOLECULES, VALUE, WATER, ONE DIMENSIONAL, REPRINTS

IDENTIFIERS: (U) Darling Dennison coupling, PE61102F, WUAFOSR2303B1

AD-A167 277 11/9 20/5 20/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Molecular Mechanics of Submicron Thin Monomeric and Polymeric Molecular Films.

DESCRIPTIVE NOTE: Final rept. 30 Jul 84-29 Jul 85,

MAR 86 6P

PERSONAL AUTHORS: Prasad, Paras N. ;

CONTRACT NO. AFOSR-84-0281

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-86-0228

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant, through the DOD-University Instrumentation program, was provided to acquire a picosecond laser system for the study of non-linear optical effects as well as for structural characterization of submicron films. The laser system consists of a CW mode-locked Nd-Yag laser (Spectra-Physics, Model 300), the output of which, after frequency doubling, is split by a 50% beam splitter to sync pump two dye lasers (Spectra-Physics, Model 375). The outputs from these dye lasers are fed into two amplifiers (Quanta Ray, Model PDA) which are pumped by the second harmonic of a 20Hz pulsed Nd-Yag laser (Quanta-Ray, Model DCR-2A). The amplified pulses are 7ps wide with 0.5MJ of pulse energy. The laser system has proven to be extremely versatile and, therefore, valuable for a number of different experiments. This arrangement also gives us the choice to generate tunable picosecond u.v. and IR pulses by mixing either of two dye laser beams with the fundamental from the pulse Yag laser.

DESCRIPTORS: (U) *LASER APPLICATIONS, *MOLECULAR STRUCTURE, *OPTICAL ANALYSIS, *MONOMOLECULAR FILMS, *POLYMERIC FILMS, MONOMERS, CONTINUOUS WAVE LASERS, MODE LOCKED LASERS, NEODYMIUM LASERS, YAG LASERS, LASERS, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, PULSED LASERS, FILMS, DYE LASERS, LASER BEAMS, MECHANICS, MOLECULES,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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MIXING, PULSES, AMPLIFIERS

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A2

AD-A167 275 20/6 14/5 9/3

TEXAS TECH UNIV LUBBOCK OPTICAL SYSTEMS LAB

(U) Space-Variant Optical Systems.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-30 Nov 85.

JAN 86 19P

PERSONAL AUTHORS: Walkup, John F. ; Krile, Thomas F. ;

CONTRACT NO. AFOSR-84-0382

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-86-0232

UNCLASSIFIED REPORT

ABSTRACT: (U) Both analytical and experimental investigations of 1-D and 2-D coherent and incoherent space-variant optical processors have been conducted. The investigations included: (1) investigation of an improved measure of the degree of invariance of a linear system and its applications to piecewise isoplanatic space-variant systems; (2) a process for generalized linear filtering of 1-D signals; (3) investigation of a very fast architecture for performing optical multiplication of binary numbers and (4) techniques for both linear and nonlinear space-variant processing based on the bilinear transform. Keywords: Space-Variant Optical Computing; Numerical Optical Processing; Optical Interconnections; Computer-Generated Holograms; Optical Cross-bar switches. (author)

DESCRIPTORS: (U) *OPTICAL CIRCUITS, *OPTICAL PROCESSING, *OPTICAL FILTERS, *HOLOGRAPHY, ARCHITECTURE, CIRCUIT INTERCONNECTIONS, COMPUTER APPLICATIONS, HOLOGRAMS, INVARIANCE, LINEAR FILTERING, LINEAR SYSTEMS, MULTIPLICATION, NUMERICAL ANALYSIS, CROSSBAR SWITCHES, PHASE CONTROL, OPTICAL SWITCHING, ONE DIMENSIONAL

IDENTIFIERS: (U) Phase invariance, PE61102F, WUAFOSR2305B1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 261 8/8 12/1 8/10 AD-A167 261 CONTINUED

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS WUAFOSR2304A1

(U) Numerical Schemes for the Estimation of Functional Parameters in Distributed Models for Mixing Mechanisms in Lake and Sea Sediment Cores.

DESCRIPTIVE NOTE: Interim rept.,

OCT 85 48P

PERSONAL AUTHORS: Banks, H. T. ; Rosen, I. G. ;

REPORT NO. LCDS-85-27

CONTRACT NO. AFOSR-84-0398

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0260

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider distributed parameter models for vertical mixing in lake and sea sediment cores. Finite dimensional approximation schemes are developed for the solution of associated inverse problems. The schemes permit one to estimate temporally and spatially varying functional parameters which appear in the parabolic partial differential equations and boundary conditions constituting the models. Theoretical convergence results are established. Numerical findings are presented which demonstrate the potential of the methods. An example involving the identification of a depth dependent mixing parameter based upon volcanic ash data from the North Atlantic is included.

DESCRIPTORS: (U) *NUMERICAL ANALYSIS, *SEDIMENTS, *MIXING, ASHES, BOUNDARIES, CONVERGENCE, CORES, DEPTH, DISTRIBUTION, ESTIMATES, INVERSION, MODELS, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, VERTICAL ORIENTATION, VOLCANOES, CORE SAMPLING, OCEAN BOTTOM, LAKES, NORTH ATLANTIC OCEAN

IDENTIFIERS: (U) Inverse problems, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 259 8/5 20/13

STANFORD UNIV CA

(U) Low Temperature Studies of Anomalous Surface Shielding and Related Phenomena.

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

SEP 84 19P

PERSONAL AUTHORS: Fairbank, William M. ;

CONTRACT NO. AFOSR-80-0026

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-86-0240

UNCLASSIFIED REPORT

ABSTRACT: (U) This research has had two objectives: (1) to study the application of cryogenic technology to the problem of gravity gradient measurements, and (2) to use such a gradiometer to make more accurate measurements of the inverse square law of gravity to test the recent experimental and theoretical suggestions that the inverse square law of gravity might be violated at laboratory distances. Since room temperature gradiometers are ultimately limited by room temperature Brownian motion, we have been experimenting with a laboratory cryogenic gradiometer which could lead to the development of a more sensitive moving baseline gradiometer for field use. Such gradiometers could have applications to problems in navigation and modeling of the earth's gravitational field.

DESCRIPTORS: (U) *CRYOGENICS, *GRADIOMETERS, *SENSITIVITY, ANOMALIES, BASE LINES, BROWNIAN MOTION, EARTH(PLANET), GRADIENTS, GRAVIMETRY, GRAVITATIONAL FIELDS, GRAVITY, INVERSION, LOW TEMPERATURE, MOTION, ROOM TEMPERATURE, SHIELDING, LABORATORY TESTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2301A8

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AD-A167 243 20/10 7/4 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Time Dependent Constants of the Motion,

83 21P

PERSONAL AUTHORS: Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0177

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in New Horizons of Quantum Chemistry, p135-154 1983.

ABSTRACT: (U) Time dependent constants of the motion enable us to treat time evolving states using techniques and points of view made familiar in stationary state problems. This review introduces the concept and main properties of time dependent constants of the motion and surveys their primary applications with special reference to the maximum entropy formalism. The role of time dependent constants in determining what dynamical information is relevant for a particular experimental situation is emphasized. Particular attention is given to the situation where the true Hamiltonian is unknown and experimental input is used to identify the time dependent constants. Keywords: Quantum chemistry.

DESCRIPTORS: (U) *QUANTUM CHEMISTRY, *HAMILTONIAN FUNCTIONS, *ENTROPY, *CONSTANTS, *TIME DEPENDENCE, DYNAMICS, STATIONARY, TIME, MOTION, EXPERIMENTAL DATA, REPRINTS

IDENTIFIERS: (U) PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 242 9/1 20/1 11/9
 STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY
 (U) Picosecond Transient Grating Studies of Polymeric Thin Films.
 FEB 86 4P
 PERSONAL AUTHORS: Rao, D. N. ; Burzynski, Ryszard ; Mi, Xin ; Prasad, Paras N. ;
 CONTRACT NO. F49620-85-C-0052, AFOSR-84-0281
 PROJECT NO. 2917
 TASK NO. A2
 MONITOR: AFOSR
 TR-86-0227

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Applied Physics Letters*, v48 n6 p387-389, 10 Feb 86.

ABSTRACT: (U) Picosecond transient grating experiments have been performed on a 5-micrometer thick polystyrene film doped with naphthalene and on a 700-micrometer thick pure polystyrene film at room temperature. In both cases, the observed acoustic modulation of the diffracted signal is explained by the formation of a thermal grating. No detectable acoustic attenuation is observed within the time delay of 6 ns, and the speed of sound obtained from the acoustic modulation period is in excellent agreement with that reported by an ultrasonic measurement. The coherent third order nonlinear electronic response observed at zero-time delay is found to be shorter than 2 ps.

DESCRIPTORS: (U) GRATINGS(SPECTRA), POLYMERIC FILMS, THIN FILMS, SOUND TRANSMISSION, ACOUSTIC ATTENUATION, ACOUSTIC VELOCITY, ACOUSTICS, COHERENCE, DIFFRACTION, ELECTRONICS, MEASUREMENT, MODULATION, RESPONSE, ROOM TEMPERATURE, THERMAL PROPERTIES, TRANSIENTS, ULTRASONICS, DOPING, NAPHTHALENES, ACOUSTIC SIGNALS, REPRINTS

IDENTIFIERS: (U) PE61102F

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AD-A167 241 6/3 12/1
 BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS
 (U) Quantitative Modeling of Growth and Dispersal in Population Models.
 DESCRIPTIVE NOTE: Interim rept..
 JAN 86 16P
 PERSONAL AUTHORS: Banks, H. T. ; Murphy, K. A. ;
 REPORT NO. LCDS-86-4
 CONTRACT NO. DAA629-83-K-0029, AFOSR-84-0398
 PROJECT NO. 2304
 TASK NO. A1
 MONITOR: AFOSR
 TR-86-0257

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at International Symposium on Mathematical Biology, Kyoto, Japan 10-15 Nov 85. Sponsored in part by NASI-17070, NSF-MCS85-04316.

ABSTRACT: (U) This document discusses techniques for the estimation of nonlinearities and state-dependent coefficients in parabolic partial differential equations. Applications to density-dependent population dispersal and nonlinear growth/predation models are presented. Computational results using parallel and vector architectures are discussed. Keywords: inverse and parameter estimation problems; insect dispersal; distributed biological systems. (Author)

DESCRIPTORS: (U) BIOLOGY, MATHEMATICAL MODELS, ARCHITECTURE, DENSITY, DISPERSING, DISTRIBUTION, ESTIMATES, GROWTH(GENERAL), INSECTS, NONLINEAR SYSTEMS, PARABOLAS, PARALLEL ORIENTATION, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, POPULATION, VECTOR ANALYSIS, COMPUTATIONS

IDENTIFIERS: (U) PE61102F

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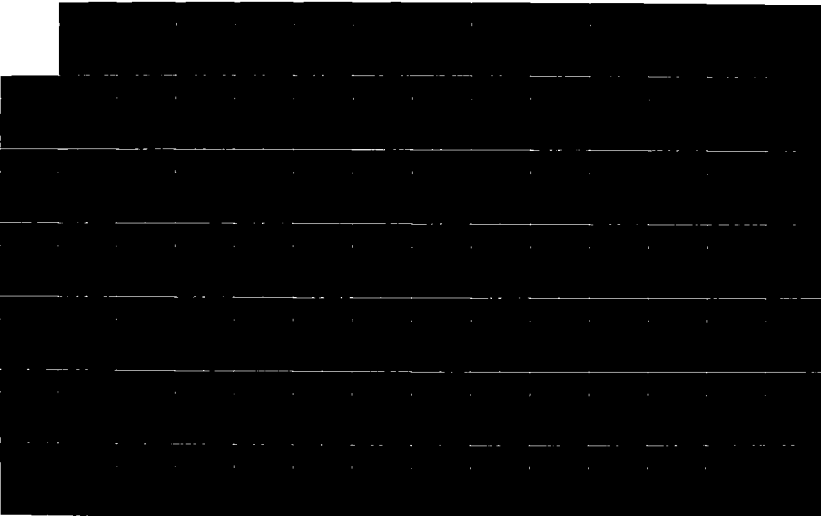
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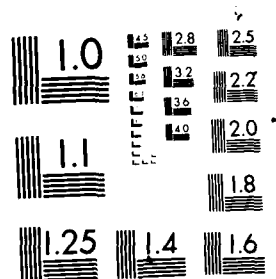
AFOSR TECHNICAL REPORT SUMMARIES APRIL-JUNE 1986(U) AIR 2/4
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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

Sulfur dioxide, WUAF0SR2303B1, PE61102F

(U) A Unified Algebraic Model Description for Interacting
Vibrational Modes in ABA Molecules.

DEC 84 13P

PERSONAL AUTHORS: Roosmalen, O. S. van ; Benjamin, I. ;
Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0190

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81
n12 p5986-5997, 15 Dec 84.

ABSTRACT: (U) A simple yet realistic model Hamiltonian which describes the essence of many aspects of the interaction of vibrational modes in polyatomics is discussed. The general form of the Hamiltonian is that of an intermediate case between the purely local mode and purely normal model limits. Resonance interactions of the Fermi and Darling-Dennison types are shown to be special cases. The classical limit of the Hamiltonian is used to provide a geometrical content for the model and to illustrate the phase-like transition between local and collective (i.e., normal) mode behavior. Such transitions are evident as the coupling parameters in the Hamiltonian are changed and also for a given Hamiltonian as the energy is changed. Applications are provided to higher lying vibrational states of specific molecules (H2O, O3, SO2, C2H2 and C2D2).

DESCRIPTORS: (U) *MOLECULAR VIBRATION, *HAMILTONIAN FUNCTIONS, POLYATOMIC MOLECULES, WATER VAPOR, OZONE, ACETYLENE, DEUTERIUM COMPOUNDS, SULFUR OXIDES, MATHEMATICAL MODELS, COUPLING (INTERACTION), PARAMETERS, INTERACTIONS, RESONANCE, REPRINTS

IDENTIFIERS: (U) Darling Dennison statistics, Fermi gas,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 235 7/3 7/4

MORTON THIOKOL INC ELKTON MD ELKTON DIV

(U) Synthesis and Chemistry of Some Furazano- and Furoxano(3,4-b)piperazines.

DEC 85 6P

PERSONAL AUTHORS: Willer, Rodney L.; Moore, Donald W.;

CONTRACT NO. F49620-85-C-0036

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0229

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v50 n25 p5123-5127 Dec 85.

ABSTRACT: (U) A series of N,N'-disubstituted furazano- and furoxano (3,4-B) piperazines have been synthesized from N,N'-disubstituted 2,3-piperazinedione dioximes by base-promoted dehydration and by basic potassium ferricyanide oxidation, respectively. The N,N'-disubstituted 2,3-piperazinedione dioximes were synthesized by reacting the appropriate N,N'-disubstituted ethylenediamine with dichloroglyoxime. Also studied was the reaction of 3,4-diaminofurazan with glyoxal and formaldehyde. The compounds have been studied by 1H and 13C NMR spectroscopy. Keywords: Nitramines; Heterocycles; and Nitrations.

DESCRIPTORS: (U) *PIPERAZINES, *HETEROCYCLIC COMPOUNDS, *SYNTHESIS(CHEMISTRY), *SPECTROSCOPY, NITRAMINES, NITRATION, OXIMES, DEHYDRATION, OXIDATION, NUCLEAR MAGNETIC RESONANCE, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

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AD-A167 234 20/10

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Algebraic Approach to Molecular Structure and Dynamics.

B2 13P

PERSONAL AUTHORS: Levine, R. D.;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Intramolecular Dynamics, p17-18 1982.

ABSTRACT: (U) In this reprint the spectrum of a Morse anharmonic oscillator and its response to an external field is discussed in detail as an introduction to the techniques, advantages and limitations of the algebraic approach. Keywords: Response to perturbation; Hamiltonian functions. (Author)

DESCRIPTORS: (U) *PERTURBATION THEORY, *ANHARMONIC OSCILLATORS, ALGEBRA, EXTERNAL, MOLECULAR STRUCTURE, REPRINTS, DYNAMICS, HAMILTONIAN FUNCTIONS, PERTURBATIONS, RESPONSE

IDENTIFIERS: (U) *Morse oscillators, WUAFOSR2303B1, PE61102F

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AD-A167 230 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Extreme Point Methods in the Determination of the Structure of a Class of Bivariate Distributions and Some Applications to Contingency Tables.

DESCRIPTIVE NOTE: Technical rept.,

JAN 86 32P

PERSONAL AUTHORS: Rao, M. B.; Krishnaiah, P. R.; Subramanyam, K.;

REPORT NO. TR-86-01

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0254

UNCLASSIFIED REPORT

ABSTRACT: (U) A decomposition of the class of all bivariate positive quadrant dependent distribution into compact convex subsets is obtained. Extreme points of these compact convex subsets are investigated. A similar decomposition works out for the class of all bivariate distributions. Extreme points of the compact convex sets figuring in this decomposition are analyzed. An application to contingency tables is presented. (Author).

DESCRIPTORS: (U) *BIVARIATE ANALYSIS, *STATISTICAL DISTRIBUTIONS, DECOMPOSITION, STRUCTURAL PROPERTIES, TABLES (DATA), QUADRANTS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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AD-A167 221 7/4 20/10 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Algebraic Approach to Molecular Rotation-Vibration Spectra,

83 4P

PERSONAL AUTHORS: Iachello, F.; Levine, R. D.;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0179

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Quantum Chemistry, v23 p1679-1681 1983.

ABSTRACT: (U) The traditional approach to the computation of the vibration (and rotation) energy levels of diatomic molecules is to solve the Schrodinger equation for a given interatomic potential. For comparison with experiment it proves convenient to expand the energy eigenvalues as per Dunham in the vibration-rotation quantum number. Such an expansion provides no information on the eigenfunctions hence the response of the molecule to a perturbation (be it due to collision or to an external field) cannot be computed. Moreover, while the procedure can, in principle (and very recently also in practice), be extended to tri- and larger polyatomics, the computational labor is considerable. In a series of recent papers we have explored an alternative approach, based on algebraic rather than on differential techniques. A summary of the recent progress in the algebraic approach to molecular spectra and dynamics is presented, with references. Particular attention is given to rotating diatomic molecules where not only the Morse but other anharmonic potentials can be discussed.

DESCRIPTORS: (U) *MOLECULAR ENERGY LEVELS, *VIBRATIONAL SPECTRA, *DIATOMIC MOLECULES, *MOLECULAR ROTATION, *SCHRODINGER EQUATION, MOLECULAR VIBRATION, SPECTRUM ANALYSIS, ALGEBRA, APPROACH, EIGENVALUES, ENERGY,

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EXTERNAL, MOLECULAR SPECTROSCOPY, VIBRATION, COMPUTATIONS,
LABOR, DYNAMICS, ENERGY LEVELS, EIGENVECTORS, MOLECULES,
RESPONSE, REPRINTS

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Mass Spectrometric Fragmentation of n-Alkanes. Self-
Consistency Test of a Statistical Theory,

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

JUL 82 6P

PERSONAL AUTHORS: Ohmichi, N. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0176

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v
n3 p178-182, 30 Jul 82.

ABSTRACT: (U) It is now well established that observed
mass spectral fragmentation patterns often do not
directly reflect the alternative dissociation models of
the parent ion. Rather, the fragments produced in the
primary dissociation can dissociate further, and so on.
This is of course particularly the case for higher-energy
electron impact as used, say, in commercial spectrometry.
Under such circumstances the application of the quasi-
equilibrium theory of mass spectra requires extensive
computation. Here we consider the application of a
somewhat more drastic statistical point of view, first
designed to deal with fragmentation patterns following
multiphoton ionization. The fragmentation patterns of n-
paraffins in the C10-C30 range are accounted for using
statistical, maximal entropy, formalism. The theory can
be used in a predictive manner. Particular attention is
given here to a quantitative test of the theory which is
independent of the uncertainties in the structure of the
fragments.

DESCRIPTORS: (U) *ALKANES, *PHOTOIONIZATION,
*STATISTICAL PROCESSES, *FRAGMENTATION, *MASS
SPECTROMETRY, COMMERCIAL EQUIPMENT, SPECTROMETERS, MASS
SPECTRA, PATTERNS, IONS, STATISTICS, STRUCTURAL
PROPERTIES, ENTROPY, DISSOCIATION, THEORY, REPRINTS

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IDENTIFIERS: (U) Paraffins, PE61102F, WUAFOSR2303B1

GEORGIA INST OF TECH ATLANTA SCHOOL OF ELECTRICAL
ENGINEERING

(U) Optical Digital Algebraic Processing for Multi-Sensor-
Array Data.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-29 Sep 85.

FEB 86 25P

PERSONAL AUTHORS: Rhodes, William T. ;

CONTRACT NO. AFOSR-84-0316

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-0231

UNCLASSIFIED REPORT

ABSTRACT: (U) This research program centered on the investigation of low-accuracy analog opto-electronic methods for processing multi-sensor-array data (e.g., phased array radar, sonar). Two methods were considered for signal orthogonalization in low-accuracy preprocessors, one based on a resonant piezo-electro-optic modulator devices. Neither method appears to offer significant benefits over all-electronic preprocessor methods because of the lack of large-scale parallelism. An analog, continuous-time opto-electronic processor for adaptive phased array signal processing was also considered that does exhibit considerable parallelism and shows promise for use as a low-accuracy co-processor in a hybrid analog/digital configuration.

DESCRIPTORS: (U) *HYBRID SYSTEMS, *RADAR, *SONAR, ALGEBRA, CONFIGURATIONS, DIGITAL SYSTEMS, HYBRID COMPUTERS, OPTICAL PROCESSING, PHASED ARRAYS

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 195 7/4 7/3

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Adsorbate Exchange and Insertion Reactions at Metal Surfaces: Hydroquinone and Naphthohydroquinone at Smooth Polycrystalline Platinum in Aqueous Solutions.

85 6P

PERSONAL AUTHORS: Soriaga, Manuel P. ; Song, Dian ; Hubbard, Arthur T. ;

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0199

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positive, HQ being the readily displaced; up to 50% of the preadsorbed HQ was displaced by NHQ after 180 s at sufficiently negative potentials.

DESCRIPTORS: (U) *ADSORPTION, *PHENOLS, *SURFACE REACTIONS, *EXCHANGE REACTIONS, *ELECTROCHEMISTRY, AROMATIC COMPOUNDS, CIRCUITS, DESORPTION, DISPLACEMENT, ELECTRODES, LAYERS, METALS, PLATINUM, POLYCRYSTALLINE, ROOM TEMPERATURE, SOLUTIONS(GENERAL), SOLUTIONS(MIXTURES), SURFACES, THIN FILMS, WATER, NAPHTHALENES, ELECTROLYTES, LIGANDS, PERCHLORIC ACID, REPRINTS

IDENTIFIERS: (U) Coadsorption, Hydroquinones, Hydroquinone/1,4-Naphtho, PE61102F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v89 n2 p285-289 1985.

ABSTRACT: (U) Coadsorption processes analogous to ligand-exchange and ligand-insertion reactions investigated at smooth polycrystalline platinum electrodes are described. Electrodes pretreated with an oriented layer of one aromatic compound were placed in contact with aqueous 1 M HClO4 electrolyte containing another aromatic compound at room temperature. Hydroquinone (HQ) and 1,4-naphthohydroquinone (NHQ) were the compounds another aromatic compound at room temperature. Hydroquinone (HQ) and 1,4-naphthohydroquinone (NHQ) were the compounds studied. Adsorption/desorption measurements were based on thin-layer electrochemical techniques. No reactions were noted when flat or vertically oriented HQ (or NHQ) was exposed to NHQ (or HQ) solutions of concentration below 0.3 mM. However, flat-adsorbed HQ or NHQ reacted with more concentrated NHQ/HQ solutions > or = 2 mM, resulting in coadsorption (insertion) or HQ/NHQ. Insertion induced flat-to-vertical reorientation, without desorption, of preadsorbed material. When vertically oriented adsorbed HQ/NHQ was exposed to concentrated NHQ/HQ solutions at open circuit for 180 s, displacement of about 5% of the preadsorbed material was observed. The extent of exchange increased as the electrode potential was made less

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

DIMENSIONAL, REPRINTS

(U) Representation of a One-Dimensional Motion in a Morse Potential by a Quadratic Hamiltonian,

IDENTIFIERS: (U) PE61102F

FEB 83 5P

PERSONAL AUTHORS: Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-86-0180

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v95
n2 p87-90, 25 Feb 83.

ABSTRACT: (U) There is considerable current interest in the dynamics of anharmonic oscillators. The algebraic hamiltonian for the Morse oscillator which is discussed here is useful not only for such studies but also for elucidating the behavior of systems of coupled anharmonic oscillators. Furthermore, the mathematical simplicity of handling a quadratic hamiltonian has made the harmonic oscillator the favorite model for a variety of applications. Much of this simplicity is retained by the present hamiltonian which should therefore lend itself to similar purposes. An extensive discussion of the algebraic description of three-dimensional oscillator. A representation of the algebraic hamiltonian for the anharmonic Morse oscillator as a quadratic form, $H = \hbar\omega(1/2 p^2 + 1/2 Q^2)$, where P and Q are operators is derived. The commutator of P and Q is an operator that tends to 1 (times the identity operator) in the harmonic limit. Coherent states and anharmonic normal modes for a linear triatomic molecule are discussed as potential applications.

DESCRIPTORS: (U) ANHARMONIC OSCILLATORS, ALGEBRA, COUPLINGS, DYNAMICS, HAMILTONIAN FUNCTIONS, HARMONICS, MORSE CODE, MORSE POTENTIAL, MOTION, ONE DIMENSIONAL, POLYATOMIC MOLECULES, QUADRATIC EQUATIONS, THREE

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

molecules.

(U) Algebraic Approach to Molecular Rotation-Vibration Spectra. II. Triatomic Molecules.

DESCRIPTORS: (U) *POLYATOMIC MOLECULES, *MOLECULAR ROTATION, *VIBRATIONAL SPECTRA, *SCHRÖDINGER EQUATION, ALGEBRA, APPROACH, COMPUTATIONS, DIATOMIC MOLECULES, DYNAMICS, EXCITATION, FERMI SURFACES, LASERS, NONLINEAR SYSTEMS, PROBABILITY, RESONANCE, SPECTRA, SYMMETRY, TRANSITIONS, MOLECULE MOLECULE INTERACTIONS, COLLISIONS, PHOTOCHEMICAL REACTIONS, SPECTRUM ANALYSIS, REPRINTS

SEP 83 24P

PERSONAL AUTHORS: Roosmalen, D. S. van ; Iachello, F. ; Levine, R. D. ; Dieperink, A. E. L. ;

IDENTIFIERS: (U) Atom molecule interactions, PEG1102F

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0182

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v79
n6 p2515-2536, 15 Sep 83.

ABSTRACT: (U) A previous article suggested an algebraic approach to molecular rotation-vibration spectra and considered the particular case of diatomic molecules. In that article, it was suggested that the algebraic approach may lead to considerable simplifications over the usual approaches (Dunham expansion and potential approach) in the treatment of two problems. (i) The description of tri- and polyatomic molecules. (ii) The calculation of transition probabilities in laser excitation and atom-molecule and molecule-molecule collisions. In this article we consider the first problem and construct explicitly the spectrum generating algebra appropriate to triatomic molecules. The algebraic approach to molecular rotation-vibration spectra introduced in a previous article is extended from di- to tri- and polyatomic molecules. The spectrum generating algebra appropriate to triatomic molecules is explicitly constructed. Its dynamical symmetries and their relation to rigid, nonrigid, linear, and nonlinear structures are discussed. Applications to the spectra of HCN, CO₂, and H₃(+) are considered. In particular, it is shown that the algebraic description can account for the Fermi resonances occurring in CO₂. Some remarks are made on the spectrum generating algebras appropriate to polyatomic

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 188 20/11

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Study of Characteristics of Dry Friction Damping.

DESCRIPTIVE NOTE: Final rept. 1 Mar 84-30 Apr 85,

APR 85 59P

PERSONAL AUTHORS: Srinivasan, A. V. ; Cassenti, B. N. ; Cutts, D. G. ;

REPORT NO. UTRC/R85-956479-2

CONTRACT NO. F49620-83-C-0076

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-0164

UNCLASSIFIED REPORT

ABSTRACT: (U) This report contains results of analytical and experimental efforts related to dry friction damping. A general time history solution is developed for a multi-degree-of-freedom system which incorporates the use of nonlocal laws of friction. The formulation and the solution are entirely nonlinear and have the necessary flexibility for modelling specific engineering problems where the presence of friction at interfaces influences the dynamics. Two examples are chosen to illustrate certain important aspects of the procedures. A friction test assembly designed and fabricated under this program served as an experimental rig. The results from a limited number of tests are presented and discussed. A comparison between analytical and experimental results is given. Keywords: Dry friction; Vibrations; and Structural dynamics.

DESCRIPTORS: (U) *FRICTION, *DAMPING, DYNAMICS, HISTORY, INTERFACES, SOLUTIONS(GENERAL), STRUCTURAL PROPERTIES, TEST EQUIPMENT, TIME, VIBRATION

IDENTIFIERS: (U) Dry friction damping, Structural dynamics. PE61102F, WUAFOSR2302B1

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AD-A167 185 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Sequential and Parallel Matrix Computations.

DESCRIPTIVE NOTE: Interim rept.,

MAR 85 6P

PERSONAL AUTHORS: Datta, Biswa N. ;

CONTRACT NO. AFOSR-82-0210

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0173

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigator has been working on parallel algorithms for various aspects of the linear control problem. Fast sequential and parallel algorithms have been developed for (i) determining relative primeness and the number of common eigenvalues between two given matrices and (ii) finding inertia and stability of a matrix. (Author)

DESCRIPTORS: (U) *EIGENVALUES, *MATRIX THEORY, ALGORITHMS, CONTROL, INERTIA, LINEAR SYSTEMS, PARALLEL PROCESSING, SEQUENCES, MATRICES(MATHEMATICS), CONTROL THEORY, SERIAL PROCESSORS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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CLEMSON UNIV SC COLL OF SCIENCES

(U) Laser Photodeposition and Etching Study.

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

JUN 85 5P

PERSONAL AUTHORS: Shier, Douglas R. ;

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-0175

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of the current research has been to employ an algebraic approach for studying the reliability of systems that can be modeled as networks. This approach has not only unified certain theoretical aspects of network reliability problems but has also suggested a number of new algorithms for calculating reliability measures. Based on this approach, both exact and approximate computational schemes have been developed, together with supporting data structures for implementing the necessary computations in an efficient manner. Empirical studies have also been designed and carried out to judge the computational merits of the various data structures. In order to increase the applicability of these research results, models have been investigated that allow the incorporation of dependent failure modes. (Author)

DESCRIPTORS: (U) *NETWORKS, *COMPUTER AIDED DESIGN *CIRCUIT INTERCONNECTIONS, *RELIABILITY(ELECTRONICS), ALGORITHMS, COMPUTATIONS, ETCHING, FAILURE, DEPOSITION, LASER BEAMS

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PITTSBURGH UNIV PA

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

DESCRIPTIVE NOTE: Final rept. 14 Dec 84-13 Dec 85.

FEB 86 10P

PERSONAL AUTHORS: Kaufman, Frederick ;

CONTRACT NO. AFOSR-85-0044

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-86-0222

UNCLASSIFIED REPORT

ABSTRACT: (U) This report discusses the Air Force's enhanced flow reactor. The major items purchased were a bakeable, differentially pumped, UHV envelope to interface the mass spectrometer to the flow tube and an excimer pumped dye laser system for laser excited fluorescence (LEF) detection of radicals in the flow tube. The LEF system, employing a Lambda Physik excimer pumped dye laser (EMG 103 MSC/FL 2001), has been operational since mid-autumn. It has already been used in preliminary studies of our new methoxy radical source. Completion of the mass spectrometer system was delayed by a variety of problems. However, by late October the required parts were on hand, and the vacuum envelope, sans mass spectrometer, was successfully pumped down. The complete system is currently assembled and undergoing final testing reactions. Keywords: Hydroxylradical, and Chemical reactions.

DESCRIPTORS: (U) *MASS SPECTROMETERS, *HYDROXYL RADICALS *VACUUM CHAMBERS, CHEMICAL RADICALS, CHEMICAL REACTIONS, COMBUSTION, DETECTION, DYE LASERS, ENVELOPE(SPACE), EXCIMERS, EXCITATION, FLOW, INTERFACES, LASER INDUCED FLUORESCENCE, LASER PUMPING, TEST METHODS, UPPER ATMOSPHERE, VACUUM, RESEARCH MANAGEMENT

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HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

(U) Superlattice Optical Bistability Research.

DESCRIPTIVE NOTE: Quarterly technical rept. 1 Jul-30 Sep 85.

SEP 85 4P

PERSONAL AUTHORS: Tehrani, Mohammad M. ;

CONTRACT NO. F49620-84-C-0071

MONITOR: AFOSR
TR-86-0165

UNCLASSIFIED REPORT

ABSTRACT: (U) The automation of Molecular Beam Epitaxy system shutters was completed for the substrate and the Mercury, Cadmium Telluride and Telluride sources. As reported earlier, the automated shutter operations allow for much more precise thickness control of the superlattice layers during the deposition. Also, from signal-to-noise considerations, performing the nonlinear optical experiments requires the use of thick (>2 micrometer) superlattice samples which involve several hundred layers of Mercury Telluride and Cadmium Telluride. This can best be accomplished by using an automated Molecular Beam Epitaxy system. The current superlattice design calls for alternate layers of HgTe and CdTe with thicknesses of 100-150 Å. A p-type sample with this structure is expected to yield a third order susceptibility ($\chi^{(3)}$) of 100 times larger than that of the bulk HgCdTe. A number of test runs were carried out with the automated MBE system. These runs resulted in five superlattice samples of various thicknesses. One sample is now being used in a preliminary experiment of optical phase conjugation to establish baseline data.

DESCRIPTORS: (U) *DEPOSITION, *MOLECULAR BEAMS, *CONTROL SYSTEMS, *OPTICAL CIRCUITS, AUTOMATION, BASE LINES, CADMIUM TELLURIDES, CONFIGURATIONS, CONTROL, CRYSTAL LATTICES, LAYERS, MERCURY, MERCURY COMPOUNDS, OPERATION, OPTICAL PROPERTIES, PRECISION, SAMPLING, SUBSTRATES, TELLURIDES, THICKNESS, EPITAXIAL GROWTH

IDENTIFIERS: (U) Shutters, Superlattices

AD-A167 176

AD-A167 172 7/3

STATE UNIV OF NEW YORK AT BINGHAMTON DEPT OF CHEMISTRY

(U) The Physical and Chemical Consequences of Cyclic Conjugation in Boracyclopolyenes. The Antiaromatic Character of Pentaarylboroles.

86 8P

PERSONAL AUTHORS: Eisch, John J. ; Galle, James E. ; Kozima, Sinpei ;

CONTRACT NO. AFOSR-85-0108

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0203

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v108 n3 p379-385 1986.

ABSTRACT: (U) Pentasubstituted boroles or boracyclopentadienes have been prepared from 1,4-dilithio-1,3-butadienes or from stannoles by interaction with arylidihalo-boranes. The boroles are unexpectedly strong Lewis acids, complexing with amines, ethers and nitriles, and very prone to oxidation, solvolytic cleavage and Diels-Alder reactions. The foregoing behavior, taken together with their unusual nuclear magnetic and electronic spectral properties, can be understood in terms of the Hückelantiaromatic character of the four pi-electron borole nucleus. By treating such nuclei as perturbed cyclopentadienyl pi-systems, an understanding of the spectral and chemical properties can be attained from such considerations. It is evident that the conjugation between the tricoordinate boron's 2p sub 2 - orbital and the four carbon butadienyldiene array is destabilizing and the source of the high reactivity of these unique, high-energy organoboranes. Keywords: Lewis acid, Molecular orbital calculations, Oxidizability, Bathochromic spectral shifts, Electron transfers

DESCRIPTORS: (U) *ORGANOBORANES, *CYCLIC COMPOUNDS, ACIDS, AMINES, BORANES, CARBON, CHEMICAL PROPERTIES,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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CLEAVAGE, DIENE SYNTHESIS, ETHERS, HIGH ENERGY, HIGH RATE, INTERACTIONS, NITRILES, NUCLEI, REACTIVITIES, SOLVOLYSIS, SPECTRA, TIN COMPOUNDS, PHYSICAL PROPERTIES, ARYL RADICALS, MOLECULAR ORBITALS, REPRINTS

IDENTIFIERS: (U) Diels alder reaction, Polyenes, Boroles, Lewis acids, PE61102F, WUAFOSR2303B2

AD-A167 171 12/1

TEXAS UNIV AT AUSTIN DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Optimum Acceleration Factors for Iterative Solutions of Linear and Non-Linear Systems.

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

DEC 85 47P

PERSONAL AUTHORS: Dulikravich, George S.; Young, David M. Jr;

CONTRACT NO. AFOSR-85-0052

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0221

UNCLASSIFIED REPORT

ABSTRACT: (U) Two different approaches to the acceleration of iterative algorithms for the numerical solution of differential systems have been developed. General form of the non-linear minimal residual method has been analytically determined and numerically confirmed for solving linear and non-linear problems. The method was applied to multi-step algorithms for effectively determining optimal values of each of the acceleration parameters at each time step. It was found that both the rate of iterative convergence and the smoothness of the iterative convergence can be substantially augmented by the use of these multiple optimal acceleration parameters. The second approach involves a composite adaptive method which is based on variational techniques. An automatic procedure for determining splitting parameters needed in the iterative solution of large sparse linear systems was developed. It was then complemented with the generalized conjugate gradient acceleration procedures and successfully applied in the symmetric successive overrelaxation method and in the shifted incomplete Cholesky method.

DESCRIPTORS: (U) *ACCELERATION, *ITERATIONS, *NUMERICAL METHODS AND PROCEDURES, ADAPTIVE SYSTEMS, ALGORITHMS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A167 170 7/4 20/2

CONVERGENCE, GRADIENTS, LINEAR SYSTEMS, LINEARITY,
NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, OPTIMIZATION,
PARAMETERS, PROBLEM SOLVING, RATES, RESIDUALS,
SOLUTIONS(GENERAL), SPARSE MATRIX,

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Ordered Ionic Layers Formed on Pt(111) from Aqueous
Solutions,

IDENTIFIERS: (U) Overrelaxation method, PE61102F

85 7P

PERSONAL AUTHORS: Stickney, John L.; Rosasco, Stephen D.;
Salaita, Ghaleb N.; Hubbard, Arthur T.;

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0198

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, vol 1 n1 p66-71
1985.

ABSTRACT: (U) Ordered layers (adlattices) formed
spontaneously when the Pt(111) surface was immersed into
aqueous ionic solutions. On the basis of Auger
spectroscopy and LEED, the following salts formed
adlattices as indicated: KCN, Pt(111)/(2 times the square
root of 3 x 2 times the square root of 3)R30 deg -KCN;
KSCN, Pt(111)/(2x2)-KSCN;K2S,Pt(111)/(diffuse 1x1)-K2S;KI,
Pt(111)/(3x3)-I;KBr,Pt(111)/(3x3)-KBr. KI solution yielded
a layer of neutral I atoms requiring no cationic
counterion, in agreement with previous studies of HI vapor
and aqueous electrosorption. All ionic concentrations
studied (.0001 to .1 M) gave similar results. The
adsorbed layer of anions functioned as a cation exchanger;
K⁺ ions were quantitatively replaced when the surface
was rinsed with .0001 M HCl or CaCl₂. Exchange of cations
did not change the LEED pattern at room temperature;
however, reconstruction occurred on heating to about 100
C in some cases. Auger spectra indicated that
hydroquinonesulfonate (KHQS) displayed a packing density
transition as a function of concentration, as expected
from electrochemical data; LEED patterns displayed no
fractional-index beams due to the KHQS layer.

DESCRIPTORS: (U) *ADSORPTION, *ION EXCHANGE, *CRYSTAL

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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LATTICES, *ELECTROCHEMISTRY, IONIZATION, LAYERS, AUGER ELECTRON SPECTROSCOPY, REPRINTS, NEUTRAL, PACKING DENSITY, PATTERNS, ROOM TEMPERATURE, SOLUTIONS(MIXTURES), SQUARE ROOTS, TRANSITIONS, WATER, CATIONS, ANIONS, ATOMS, SURFACE CHEMISTRY, POTASSIUM COMPOUNDS, SALTS, SULFONATES, PHENOLS

AD-A167 169 7/4 7/3

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Competitive Chemisorption from Binary Surfactant Mixtures at Solid-Liquid Interfaces: Hydroquinone and Naphthohydroquinone at Smooth Polycrystalline Platinum in Aqueous Solutions.

85 6P

PERSONAL AUTHORS: Soriaga, Manuel P. ; Song, Dian ; Zapfen, Donald C. ; Hubbard, Arthur T. ;

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0200

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, vol 1 n1 p123-127 1985.

ABSTRACT: (U) Competitive chemisorption of hydroquinone (HQ) and 1,4-naphthohydroquinone (NHQ) from aqueous solutions onto smooth polycrystalline platinum has been studied at room temperature. Adsorption measurements were based on thin-layer electrochemical methods. When HQ and NHQ were both present at low concentrations (C superscript 0 < 0.1 mM), a mixed adsorbed layer was formed in which the two species were oriented flat. At higher total concentrations an orientational transition occurred, and for C superscript 0 > 1 mM the mixed adlayer consisted of both species oriented vertically. Preferential adsorption of NHQ over HQ was exhibited at all bulk compositions studied. A plot of surface mole fraction ratio ($X_{\text{sub NHQ surf}}/X_{\text{sub HQ surf}}$) against solution mole fraction ratio ($X_{\text{sub NHQ sol}}/X_{\text{sub HQ sol}}$) was linear in the concentration regime where both compounds were adsorbed edgewise and the molecular area requirements were identical. This linearity suggested that the mixed interactions between HQ and NHQ are very similar to the self-interactions for the pure compounds. The slope of this plot indicated that the initial adsorption rate constant of NHQ is at least twice as

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK55I

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large as that of HQ.

DESCRIPTORS: (U) *CHEMISORPTION, *PHENOLS, *ELECTROCHEMISTRY, *QUINONES, ADSORPTION, CONSTANTS, INTERACTIONS, LAYERS, MEASUREMENT, MIXING, MOLECULES, PLATINUM, PLOTTING, POLYCRYSTALLINE, PURITY, RATES, REQUIREMENTS, ROOM TEMPERATURE, SOLUTIONS(MIXTURES), SURF, SURFACES, THIN FILMS, WATER, NAPHTHALENES, SURFACE ACTIVE SUBSTANCES, REPRINTS

IDENTIFIERS: (U) *Hydroquinone, Hydroquinone/1,4-Naphtho, PE61102F

AD-A167 168 7/4 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) High-Lying Levels of Ozone via an Algebraic Approach,

83 4P

PERSONAL AUTHORS: Benjamin, I. ; Levine, R. D. ; Kinsey, J. L. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0181

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v87 n5 p727-729 1983.

ABSTRACT: (U) An algebraic Hamiltonian for the vibrational motion in ozone, including a Darling Dennison type coupling term, is used to fit the recently observed high overtones. The good quality of the fit is due to the coupling of anharmonic normal modes by a quartic order (Darling Dennison type) coupling term. The algebraic Hamiltonian contains six parameters and these suffice to provide a better fit than the six-parameter spectroscopic term formula which uses a Darling Dennison type coupling among harmonic modes. The present results provide a hitherto unexplored quantitative application of the algebraic approach to perturbed high lying states of triatomics. Keywords: Reprints; Ozones; and High lying levels.

DESCRIPTORS: (U) *OZONE, *HAMILTONIAN FUNCTIONS, *MOLECULAR VIBRATION, *ATOMIC ENERGY LEVELS, COUPLING(INTERACTION), ALGEBRA, MOTION, QUARTIC EQUATIONS, REPRINTS, VIBRATION, APPROACH, FITTING FUNCTIONS(MATHEMATICS)

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 164 9/4 12/1

PENNSYLVANIA UNIV PHILADELPHIA

(U) Statistic 1 Techniques for Signal Processing.

DESCRIPTIVE NOTE: Interim rept. 1 Nov 84-28 May 85.

MAY 85 5P

PERSONAL AUTHORS: Kassam, S. A. ;

CONTRACT NO. AFOSR-82-0022

PROJECT NO 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0172

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the progress made since November 1, 1984 under this grant. The primary contributions have been on nonlinear smoothers, quantization, and nonparametric and robust detection and filtering.

DESCRIPTORS: (U) *DETECTION, *STATISTICAL PROCESSES, *SIGNAL PROCESSING

IDENTIFIERS: (U) PE61102F

AD-A167 163 20/6 20/2

HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

(U) Superlattice Optical Bistability Research.

DESCRIPTIVE NOTE: Semi-annual rept. 1 Oct-30 Dec 85.

JAN 86 5P

PERSONAL AUTHORS: Tehrani, Mohammad M. ;

CONTRACT NO. F49620-84-C-0071

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-0166

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes our progress and results during this reporting period. Our experiments show that the growth of thick (approx 5 micrometers) superlattice samples of HgTe/CdTe requires the use of an MBE system with in situ diagnostic capability to assure stability of growth parameters for periods of several hours. Our efforts with our in house MBE system have not succeeded in growing thick superlattice samples needed for the optical experiments.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *OPTICAL MATERIALS, CRYSTAL LATTICES, SAMPLING, STABILITY, THICKNESS, CADMIUM TELLURIDES, MOLECULAR BEAMS

IDENTIFIERS: (U) Superlattices, Optical bistability, Mercury Tellurides, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 161 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) A Simple Sum Rule for Total Radiative Decay Rates in Diatomics.

MAR 84 3P

PERSONAL AUTHORS: Tellinghuisen, Joel ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0216

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v105 n3 p241-242, 16 Mar 84.

ABSTRACT: (U) In diatomic spectroscopy the calculation of the total radiative decay rate for fluorescence out of a specific (V prime, J prime) level of an excited electronic state to all levels of a lower state involves the evaluation of a sum and integral. The quantity (V superscript 3), which occurs in expressions for the total radiative decay rate for an excited vibronic state of a diatomic, is evaluated as a simple expectation value for the initial state. In test calculations this expectation value agrees with the exact sum over states within approx. 0.2%

DESCRIPTORS: (U) *DIATOMIC MOLECULES, *EMISSION SPECTROSCOPY, COMPUTATIONS, ELECTRONIC STATES, EXCITATION, RATES, MOLECULAR VIBRATION, DECAY SCHEMES, FLUORESCENCE, REPRINTS

IDENTIFIERS: (U) Sum rules, PE61102F, WUAFOSR2303B1

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AD-A167 160 20/8

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Formal Scattering Theory by an Algebraic Approach.

FEB 85 4P

PERSONAL AUTHORS: Alhassid, Y. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0193

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v54 n8 p739-741, 25 Feb 85.

ABSTRACT: (U) Formal scattering theory is recast in a Lie-algebraic form. The central result is an algebraic Lippmann-Schwinger equation for the wave operator from which an algebraic form of the Born series (containing only linked terms) is obtained. When a finite Lie algebra is sufficient, the Moller wave operator, on the energy shell, can be solved for explicitly as an element of the corresponding group. The method is illustrated for the separable potential whose relevant algebra is found to be U(1,1). Keyword: Reprint. (Author)

DESCRIPTORS: (U) *ALGEBRA, *RESONANCE SCATTERING, ENERGY, LINKAGES, OPERATORS(MATHEMATICS), REPRINTS, SEPARATION, THEORY, WAVE EQUATIONS

IDENTIFIERS: (U) *Lie algebras, Lippmann Schwinger equation, PE61102F, WUAFOSR2303B1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 159 20/8

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Resonance Widths and Positions by an Algebraic Approach.

APR 85 5P

PERSONAL AUTHORS: Alhassid, Y. ; Iachello, F. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0196

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v54 n16 p1746-1749, 22 Apr 85.

ABSTRACT: (U) The use of nonunitary discrete, irreducible representations of Lie algebras is proposed as a method for the determination of widths and energies of resonances. The method is illustrated by explicit application to three kinds of resonances; in transmission over a well, in transmission over a barrier, and in barrier penetration for a family of one-dimensional potentials. The same procedure is also useful in an algebraic approach to scattering by a complex (optical) potential, and for parametrization of the resonant contribution to the scattering matrix. Keyword: Reprints. (Author)

DESCRIPTORS: (U) *ALGEBRA, *RESONANCE SCATTERING, BARRIERS, DETERMINATION, PENETRATION, REPRINTS, WIDTH

IDENTIFIERS: (U) Lie algebras, PE61102F, WUAFOSR2303B1

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VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Analysis of the D' yields A' Transition in BrF.

DEC 84 5P

PERSONAL AUTHORS: Henderson, Stuart D. ; Tellinghuisen, Joel ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v112 n6 p543-546, 28 Dec 84.

ABSTRACT: (U) All of the diatomic halogen, both homo- and hetero-nuclear, display strong UV-visible emission spectra in the presence of large pressures of inert buffer gas. In many cases these spectra have been known for decades, and in seven of these molecules - I2, Br2, Cl2, F2, IF, BrF, and ClF - the transition in question has been made to last. It is clear that these emission bands represent charge-transfer transitions from ion-pair excited states to low-lying excited valence states. Yet somewhat surprisingly, in only three cases - I2, Br2, and ClF - have the dominant transitions been analyzed in any detail. The emission spectrum of BrF in the 3400-3600 Å region is recorded and analysed for Bromine 79 Fluorine 19 and Bromine 81 Fluorine 19. The transition is assigned as D prime(2) yields A prime (2), in which D prime belongs to the lowest cluster of three ion-pair states, and A prime is the lowest excited valence state. The main spectroscopic constants are included in this report.

DESCRIPTORS: (U) *EMISSION SPECTRA, *ELECTRON TRANSITIONS, *ELECTRONIC STATES, *BROMINE COMPOUNDS, *FLUORIDES, BUFFERS, CONSTANTS, DIATOMIC MOLECULES, EXCITATION, GASES, HALOGENS, INERT MATERIALS, MOLECULES, PRESSURE, SPECTROSCOPY, ULTRAVIOLET RADIATION, VALENCE, VISIBLE SPECTRA, YIELD, CHARGE TRANSFER, ION ION

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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INTERACTIONS, CLUSTERING, REPRINTS

IDENTIFIERS: (U) Ion pairs, PEB1102F, WUAFOSR2303B1

AD-A167 157 7/4 20/10

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) A Simple Sum Rule for Total Radiative Decay Rates--
Comparison of Quantal and Classical Methods for
Diatomics,

DEC 84 8P

PERSONAL AUTHORS: Tellinghuisen, Joel ;Julienne, Paul S. ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0213

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Jnl of Chemical Physics, v81
n12 pt 1 p5779 5785, 15 Dec 84

ABSTRACT: (U) Total radiative decay coefficients for
electronic transitions in diatomic molecules are
evaluated by means of an initial state expectation value
 $\langle V\text{-cubed}(R) | \mu \text{ sub el squared}(R) | V \rangle$ (V = difference
potential, micron = transition moment function) in place
of the usual sum over final states. This exception value
is calculated by quantal and classical methods and
compared with the exact expression as a function of
reduced mass and initial vibrational state for several
combinations of initial and final potentials and
transition moment functions. The errors in both the sum
rule and its classical implementation seldom exceed 1%,
and then only for hydrogenic reduced mass. Keywords:
Radiative decay coefficients electronic transitions,
Diatomic molecules; and Reprints

DESCRIPTORS: (U) DIATOMIC MOLECULES ELECTRON
TRANSITIONS, DECAY SCHEMES, QUANTUM THEORY
COEFFICIENTS, MASS MOMENTS, REDUCTION, REPRINTS
MOLECULAR VIBRATION

IDENTIFIERS: (U) Sum rules(physics), Expectation values,
PEB1102F, WUAFOSR2303B1

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 156 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Vibrational and Rotational Energy Disposal in the H + O₂ Reaction at 1.3 eV: Surprisal Analysis of Experiments and Computations.

JUN 84 6P

PERSONAL AUTHORS: Zamir, E. ; Levine, R. D. ; Bernstein, R. B. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0188

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v107 n3 p217-221, 1 Jun 84.

ABSTRACT: (U) Recent independent experimental determinations, by Zare and Valentini and their co-workers, of the HD product state distribution are consistent with a common set of surprisal parameters: $\lambda_{\text{sub } \nu} \text{ approx. } = 2$ and $\theta_{\text{sub } r}$ in the range 3-5. Analysis of the computational results of Blais and Truhlar suggest that a somewhat larger fraction of the available energy is channeled into rotation and that the orientation of the emergent HD molecule is constrained. Keywords: Reprints; Hydrogen deuteride; Vibrational energy; and Rotational energy.

DESCRIPTORS: (U) *DEUTERIUM COMPOUNDS, *HYDROGEN COMPOUNDS, *MOLECULAR ROTATION, *MOLECULAR VIBRATION, COMPUTATIONS, DISTRIBUTION, ENERGY, REPRINTS, ENERGY TRANSFER

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

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AD-A167 153 6/16 5/10

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Uncertainty Relation for Resolution in Space, Spatial Frequency, and Orientation Optimized by Two-Dimensional Visual Cortical Filters.

JUL 85 14P

PERSONAL AUTHORS: Daugman, John G. ;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0244

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Optical Society of America A, v2 n7 p1160-1169 Jul 85.

ABSTRACT: (U) Two-dimensional spatial linear filters are constrained by general uncertainty relations that limit their attainable information resolution for orientation, spatial frequency, and two-dimensional (2D) spatial position. The theoretical lower limit for the joint entropy, or uncertainty, of these variables is achieved by an optimal 2D filter family whose spatial weighting functions are generated by exponentiated bivariate second-order polynomials with complex coefficients, the elliptic generalization of the one-dimensional elementary functions proposed in Gabor's famous theory of communication. Evidence is presented that the 2D receptive-field profiles of simple cells in mammalian visual cortex are well described by members of this optimal 2D filter family, and thus such visual neurons could be said to optimize the general uncertainty relations for joint 2D-spatial-2D-spectral information resolution. The variety of their receptive-field dimensions and orientation and spatial-frequency bandwidths, and the correlations among these, reveal several underlying constraints, particularly in width/length aspect ratio and principal axis organization, suggesting a polar division of labor in occupying the quantal volumes of information hyperspace.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 153 CONTINUED

DESCRIPTORS: (U) *VISUAL CORTEX, *FILTERS, *VISION, ELLIPSES, SIGNAL PROCESSING, POLYNOMIALS, AXES, ORGANIZATIONS, RESOLUTION, MAMMALS, QUANTUM THEORY, VOLUME, FREQUENCY, SPATIAL DISTRIBUTION, WEIGHTING FUNCTIONS, COEFFICIENTS, ENTROPY, FUNCTIONS, ONE DIMENSIONAL, CELLS, POSITION(LOCATION), LIMITATIONS, COMMUNICATION AND RADIO SYSTEMS, THEORY, CEREBRAL CORTEX, TWO DIMENSIONAL, ASPECT RATIO, LENGTH, WIDTH, LINEAR FILTERING, SPATIAL FILTERING, NERVE CELLS

IDENTIFIERS: (U) Uncertainty, PE61102F, WUAFOSR2313A5

AD-A167 138 6/16 5/10 5/5

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Quantification of Interference and Detectability Properties of Visual Stimuli for Optimal Display Design.

DESCRIPTIVE NOTE: Final rept. Jun 81-Feb 85.

JAN 86 36P

PERSONAL AUTHORS: Kronauer, Richard E. ;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0248

UNCLASSIFIED REPORT

ABSTRACT: (U) Masking provides information about spatial-temporal tuning of detectors. The detectability of a test sine-wave grating was measured in the presence of a mask of one or more sine-wave gratings. Patterns varied in spatial frequency, orientation and velocity. Conclusions of 4 studies are: 1) Orientation and spatial frequency tuning are not separable; changing relative mask-test spatial frequency changes orientation tuning. 2) Patterns moving in opposite directions are not detected independently; right and left moving patterns mask each other and are detected by opponent-motion mechanisms sensitive to opposite velocities. At threshold, opposite directions may be detected independently. 3) Masking of a wide range of tests by a vertical mask of 4cpd, moving left or right at 4 hz, showed: a) asymmetry wherein low spatial and temporal tests were strongly masked and high spatial frequencies were facilitated; b) non-separability of the three tuning variable of spatial and temporal frequency and orientation, ruling out simple explanation. 4) A mask consisting of a small group of spectral components (simulating bandlimited 2D noise) produced strong masking by obscuring beats that would otherwise occur (and aid detection) when a single sine-wave test grating is added to a single sine-wave mask. Keywords: Human vision, Psychophysics, and Masking.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 138 CONTINUED

DESCRIPTORS: (U) *VISION, *GRATINGS(SPECTRA), *SINE WAVES, *MASKING, *STIMULI, *DISPLAY SYSTEMS, ASYMMETRY, DETECTION, FREQUENCY, HIGH FREQUENCY, HUMANS, MASKS, MOTION, OPTIMIZATION, ORIENTATION(DIRECTION), PARTS, PATTERNS, PSYCHOPHYSICS, SPATIAL DISTRIBUTION, SPECTRA, TUNING, VISUAL PERCEPTION, HUMAN FACTORS ENGINEERING, PATTERN RECOGNITION, INTERFERENCE

IDENTIFIERS: (U) PE61102F

AD-A167 137 17/1 20/2

DREXEL UNIV PHILADELPHIA PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Research on the Statistics of Grain Lattice Echoes and Their Use in Grain Size Estimation and Grain Echo Suppression.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 84-29 Sep 85.

DEC 85 158P

PERSONAL AUTHORS: Amir, Israel ;Newhouse, V. L. ;

CONTRACT NO. AFOSR-84-0125

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-0170

UNCLASSIFIED REPORT

ABSTRACT: (U) Two topics dealing with the reflection of ultrasound bursts from random media are discussed in this work. Chapter 2 develops a general formulation of the echo received from a random scatterer ensemble illuminated by a short electromagnetic or sonic signal. It is shown theoretically that a gradient in either scatterer concentration or in the field function of the transmitter/receiver will return an echo which is partially spatially coherent. From the degree of coherency, i.e. from the ratio of the random part to the nonrandom part of the reflected signal, the scatterer concentration and scattering cross-section can be calculated. Scattering concentration gradient creates a coherent reflection from whose degree of coherency the scattering concentration can be estimated. Chapter 3 and 4 deal with signal processing techniques for the reduction of clutter noise created by random media composed of a high concentration of point scatterers. The problem is to enhance a target embedded in a random medium when the clutter noise variance and the target echo location and amplitude are unknown. Chapter 3 analyzes theoretically a technique called Minimization algorithm. This technique splits the received signal spectrum into n frequency windows. The minimum of the

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squared signals at each range delay is then chosen. The calculated SNRE (signal to noise ratio enhancement) of this technique agrees well with previous experiments. The Receiver Operating Characteristics (ROC) is calculated and the improved SNRE of Minimization is found to be negated by loss in detection properties.

DESCRIPTORS: (U) *COHERENCE, *ULTRASONIC RADIATION, *ACOUSTIC SCATTERING, *CRYSTAL LATTICES, ALGORITHMS, CLUTTER, CONCENTRATION (COMPOSITION), CROSS SECTIONS, DELAY, DETECTION, ELECTROMAGNETIC RADIATION, ESTIMATES, FORMULATIONS, GRADIENTS, GRAIN SIZE, MEDIA, OPTIMIZATION, POSITION (LOCATION), RATIOS, SHORT RANGE (TIME), SIGNAL PROCESSING, TARGET ECHOES, TARGETS, TRANSMITTER RECEIVERS, VARIATIONS, ACOUSTIC REFLECTION, NOISE REDUCTION

IDENTIFIERS: (U) ROC (Receiver Operating Characteristics), PE61102F

AD-A167 136 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) The Franck-Condon Principle in Bound-Free Transitions.

85 35P

PERSONAL AUTHORS: Tellinghuisen, Joel ;

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0205

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Photodissociation and Photoionization, p299-369 1985.

ABSTRACT: (U) The role of the Franck Condon principle in the interpretation and analysis of bound free transitions in diatomic molecules is discussed. Emphasis is placed on radiative transitions, both absorption and emission, but a brief discussion of pre-association is also included. Radiation relations of relevance to diatomic transitions are summarized. Theoretical aspects of the Franck Condon principle are discussed, including the classical and semiclassical implementations. The main points are illustrated with many examples, mostly from the author's work. A review of the recent literature of the field is included. (Reprints).

DESCRIPTORS: (U) *ELECTRON TRANSITIONS, *DIATOMIC MOLECULES, *RADIATIVE TRANSFER, REPRINTS, EMISSION SPECTRA, RADIATION ABSORPTION

IDENTIFIERS: (U) *Franck Condon Principle, PE61102F

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CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) A Linear Array for Rayleigh Scattering.

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

JUN 85 27P

PERSONAL AUTHORS: Talbot, L. ;

CONTRACT NO AFOSR 83-0229

PROJECT NO 2917

TASK NO A1

MONITOR AFOSR
TR 86-0161

DESCRIPTORS: (U) *COMBUSTION, *FLAMES, *LASER BEAMS,
*RAYLEIGH SCATTERING, *TURBULENCE, BANDPASS FILTERS,
CONFIGURATIONS, DENSITY, GASES, IMAGE
INTENSIFIERS(ELECTRONICS), IMAGE PROCESSING, INDICATORS,
LASERS, LIGHT, LINEAR ARRAYS, METHODOLOGY, MIXING,
OPTICAL IMAGES, PROCESSING, QUALITATIVE ANALYSIS,
QUANTITATIVE ANALYSIS, SCATTERING, STRUCTURAL PROPERTIES,
THICKNESS, TIME DEPENDENCE

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1

UNCLASSIFIED REPORT

ABSTRACT: (U) Gas density under combustion conditions can be obtained by measuring the intensity of the molecular (Rayleigh) scattering of light from a laser beam. A system which obtains an essentially continuous record of the density along a length of the laser beam is described. The temperature and degree of combustion can thus be determined for a number of interesting combustion configurations, which will ultimately lead to a better description and understanding of combustion flow flame field phenomena. An image of Rayleigh scattered light from the combustion region is projected onto a monolithic self scanning linear photodiode array by means of a lens, bandpass filter, slit, image intensifier, and fiber optic reducer. The video output of the linear array is digitized and stored, creating a space-time map of the density which can be visualized and manipulated as an image. Analysis of these images by image processing techniques gives qualitative and quantitative information about such features of the combustion zone as flame wrinkling and periodicity, flame thickness and continuity, and other structural and time dependent properties in the combustion region. Following a brief introduction, the components are described, the system performance characteristics are discussed, and an example of a processed image from a simple turbulent flame is presented. Keywords: Rayleigh scattering; Premixed turbulent flames; Laser imaging.

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TEXAS TRANSPORTATION INST COLLEGE STATION

IDENTIFIERS: (U) Portland cement, PE61102F,
WUAFOSR2302C2

(U) Fracture in Stabilized Soils. Volume 2.

DESCRIPTIVE NOTE: Final technical rept.,

DEC 85 137P

PERSONAL AUTHORS: Little, D. N. ; Crockford, W. W. ; Kim, Y. ;

CONTRACT NO. F49620-82-K-0027

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR
TR-86-0242-VOL-2

UNCLASSIFIED REPORT

ABSTRACT: (U) Conventionally the thickness design of stabilized soil layers has been based upon the tensile strength of the stabilized soil layer and/or the appearance of the first crack. The design literature does not allow one to consider the true development of cracking in the stabilized soil layer. Knowledge of the mode of such cracking could drastically alter the philosophy behind thickness design of layers. In this research, the principles of theoretical fracture mechanics are used to explain the mode and mechanism of fracture in fine grained media stabilized with portland cement. Experimental fracture mechanics is used to validate or verify and in some cases to investigate more fully the hypothesized mechanisms of fracture. The influence of osmotic and matrix soil section, temperature, binder content, thermal and kinetic energy, from sources outside the crack, are considered in the study. Linear elastic fracture mechanics is proven to be a highly acceptable analytical tool for these materials. (Author)

DESCRIPTORS: (U) *FRACTURE (MECHANICS), *SOIL MECHANICS, CEMENTS, CRACKS, ELASTIC PROPERTIES, FINE GRAINED MATERIALS, LAYERS, LINEARITY, MECHANICS, SOILS, STABILIZATION, TENSILE STRENGTH, THICKNESS, SOIL STABILIZATION, CRACK PROPAGATION, FINITE ELEMENT ANALYSIS, COMPUTER PROGRAMS

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SEARCH CONTROL NO. EVK551

AD-A167 103 20/12 20/3 20/2 7/4
 ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER
 (U) Chemistry of Non-Equilibrium Film Deposition.
 DESCRIPTIVE NOTE: Final rept. 30 Jun 81-1 Oct 85.
 DEC 85 27P
 PERSONAL AUTHORS: Kobrin, P. H. ; Harker, A. B. ;
 REPORT NO. SC5307.4FR
 CONTRACT NO. F49620-81-C-0074
 PROJECT NO. 2303
 TASK NO. A2
 MONITOR: AFOSR
 TR-86-0241

UNCLASSIFIED REPORT

ABSTRACT: (U) Reactive ion-beam deposition was used to deposit amorphous thin films of dielectric oxides onto low-temperature substrates. Films of TiO₂ and PLZT were prepared from metallic and dielectric targets under various beam conditions. Post deposition annealing studies showed the temperature of the crystalline phase transition to be directly affected by film density and thickness. The growth of large grains on the multication PLZT was restricted by continuous porosity resulting from density changes in the film during transformation.
 keywords: Thin films; Titanium dioxide; Ion beam deposition; Annealing; Transmission electron microscopy; Lanthanum modified lead zirconate; and Titanate

DESCRIPTORS: (U) *DIELECTRIC FILMS, *CRYSTAL GROWTH, *THIN FILMS, ANNEALING, CHEMISTRY, CRYSTAL STRUCTURE, DENSITY, DEPOSITION, DEPOSITS, DIELECTRICS, ELECTRON MICROSCOPY, FILMS, ION BEAMS, LIMITATIONS, LOW TEMPERATURE, METALS, NONEQUILIBRIUM FLOW, OXIDES, PHASE TRANSFORMATIONS, POROSITY, REACTIVITIES, SUBSTRATES, TARGETS, THICKNESS, TITANIUM DIOXIDE, TRANSMITTANCE, AMORPHOUS MATERIALS, LANTHANUM, LEAD COMPOUNDS, ZIRCONATES, TITANATES

IDENTIFIERS (U) PE61102F, WUAFOSR 303A2

AD A167 103

AD-A167 101 12/1
 BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS
 (U) Classification of Traveling Wave Solutions of Reaction-Diffusion Systems.
 DESCRIPTIVE NOTE: Interim rept.,
 DEC 85 85P
 PERSONAL AUTHORS: Mischaikow, Konstantin ;
 REPORT NO. LCDS-86-5
 CONTRACT NO. DAAG29-83-K-0029, AFOSR-81-0116
 PROJECT NO. 2304
 TASK NO. A1
 MONITOR: AFOSR
 TR-86-0259

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant AFOSR-84-0376

ABSTRACT: (U) A classification scheme is presented for traveling wave solutions of reaction diffusion systems of the form $x_{sub t} = x_{sub alpha} alpha + Del V(x)$ where t_i are elements of R , x is an element of R superscript n and $V: R$ superscript n approaches R . The important assumptions on V are that the limit as the absolute value of x approaches infinity of $V(x)$ is minus infinity, that the set $\{xbar{V}(x) > -Q\}$ is convex for Q sufficiently large that V has a finite number of critical points, and that if $M_{sub 1}$ and $M_{sub 2}$ are critical points of V then $V(M_{sub 1})$ not equal $V(M_{sub 2})$. The primary tools used are the Conley index and connection matrix. The classifications are given via paths in graphs whose vertices and edges are connection matrices. These results are then used to prove the existence of an infinite number of traveling wave solutions for a specific example

DESCRIPTORS: (U) *TRAVELING WAVES, *DIFFUSION, *REACTION CONTROL SYSTEMS, SOLUTIONS(GENERAL), GRAPHS, CLASSIFICATION, MATRICES(MATHEMATICS)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK55I

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AD-A167 099 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFQSR2304A1

(U) Bootstrapping Nonlinear Least Squares Estimates in the Kalman Filter Model.

DESCRIPTIVE NOTE: Technical rept..

JAN 86 27P

PERSONAL AUTHORS: Stoffer, David S. ;

REPORT NO. TR-86-02

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

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFQSR
TR-86-0252

UNCLASSIFIED REPORT

ABSTRACT: (U) The bootstrap is proposed as a method for estimating the precision of forecasts and maximum likelihood estimates of the transition parameters of the Kalman filter model when the estimates are obtained via Newton-Raphson. It is shown that when the system and the filter are in steady state, the bootstrap applied to the Gaussian innovations yields asymptotically consistent standard errors. That the boot strap works well with moderate sample sizes and supplies robustness against departures from normality is substantiated by empirical evidence. Keywords: Parameter estimation. (Author)

DESCRIPTORS: (U) *KALMAN FILTERING, *LEAST SQUARES METHOD, ERRORS, ESTIMATES, FORECASTING, MODELS, NORMALITY, PARAMETERS, PRECISION, STEADY STATE, TRANSITIONS, PARAMETRIC ANALYSIS, NONLINEAR ANALYSIS, GAUSSIAN QUADRATURE

IDENTIFIERS: (U) Bootstrapping, Minimum likelihood estimation, Robust procedures, Newton Raphson method, PE61102F, WUAFQSR2304A5

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AD-A167 097 CONTINUED

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A2

(U) Experimental Chemical Physics: A 'Next Generation'
Machine.

DESCRIPTIVE NOTE: Final rept. 30 Jul 84-29 Jul 85.

FEB 86 8P

PERSONAL AUTHORS: Wittig, Curt ; Reisler, Hanna ;

CONTRACT NO. AFOSR-84-0294

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-86-0206

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental arrangement is described which is used for studying gas phase elementary processes as well as gas/surface interactions. It consists of two separate parts: A photofragment spectrometer with LIF detection is used to study photoinitiated unimolecular and bimolecular reactions. An ultra high vacuum scattering chamber with MPI and mass spectrometric detection is used to probe fragments generated via molecule/molecule and molecule/surface interactions. A sophisticated data acquisition system is described based on LSI/11 23+ laboratory computers, that includes digital data collection, programmable pulse-and-delay generators, and simultaneously monitoring signals from several chemically distinct species. Keywords: Phase processors; Unimolecular and bimolecular reactions; Interactions; Photofragment; Spectrometer.

DESCRIPTORS: (U) *GAS SURFACE INTERACTIONS, *MOLECULE MOLECULE INTERACTIONS, *REACTION KINETICS, *SPECTROMETRY, CHEMICALS, DATA ACQUISITION, DATA BASES, DETECTION, DIGITAL SYSTEMS, FRAGMENTS, INTERACTIONS, MASS SPECTROMETRY, MOLECULES, MONITORING, PHYSICS, PROBES, REACTION KINETICS, SIGNALS, SPECTROMETERS, SURFACES, VAPOR PHASES, COMPUTERS, PHOTOCHEMICAL REACTIONS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 096 7/4 20/10

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) On the Efficiency and Accuracy of Quantum and Classical Methods of Calculating Diatomic Spectra.

JUN 84 4P

PERSONAL AUTHORS: Tellinghuisen, Joel ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0215

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v80
n11 p5472-5474, 1 Jun 84.

ABSTRACT: (U) Several methods of calculating low-resolution diatomic spectra under thermal equilibrium conditions are examined with respect to accuracy and computational efficiency. When the vibrational interval in the initial state is approx $kT/2$ or less, the quasistatic classical method is reliable to better than 1% of peak intensity. In quantum computations, discrete transitions can often be modeled as bound-free for convenience. Some CPU time bench marks are given for the various calculations. Keywords: Reprints; Quantum Classical Calculating Diatomic Spectra.

DESCRIPTORS: (U) *QUANTUM THEORY, *DIATOMIC MOLECULES, *VIBRATIONAL SPECTRA, *MOLECULAR SPECTROSCOPY, ACCURACY, COMPUTATIONS, EFFICIENCY, INTERVALS, LOW RESOLUTION, REPRINTS, TRANSITIONS, MOLECULAR VIBRATION, CHEMICAL EQUILIBRIUM, THERMAL PROPERTIES

IDENTIFIERS: (U) PE61102E, WUAFOSR2303B1

AD-A167 096

AD-A167 095 5/9

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Spatial Visual Channels in the Fourier Plane.

84 21P

PERSONAL AUTHORS: Daugman, John G. ;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0243

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v24 n9 p891-910 1984.

ABSTRACT: (U) Properties of human spatial visual channels were studied in two-dimensional form by a signal detection masking paradigm. Tuning surfaces of contrast threshold elevation induced by a sinusoidal mask were generated for four Subjects, interpolated from an 11x11 Cartesian grid over the Fourier plane, and numerically Fourier transformed in two dimensions to infer putative filter profiles in the 2D space domain. Among the main findings in the 2D frequency domain were: 1) Threshold elevation surfaces are highly polar nonseparable--they cannot be described as the product of a spatial frequency tuning curve times an orientation tuning curve. 2) Iso-half amplitude contours of the spectral tuning surfaces have a length/width elongation ratio of about 2:1 3) Necessarily, resolution for spatial frequency and for orientation are in fundamental competition with 2D resolution. By calculating the occupied area of the inferred filters both in the 2D space domain and in the 2D frequency domain, it was estimated that these mechanisms approach within a factor of 2.5 of the theoretical limit of joint resolution in the two 2D domains that can be derived by 2D generalization of Gabor's famous Theory of Communication. Other classes of 2D filters, such as an ideal 2D bandpass filter, have joint 2D entropies which are suboptimal by a factor of 13 or more. Subject of the inherent constraints on inference

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from these 2D masking experiments, the evidence suggests that 2D spatial frequency channels can be described as elongated 2D spatial wave-packets which crudely resemble optimal forms for joint information resolution in the 2D spatial and 2D frequency domains.

DESCRIPTORS: (U) *COMPUTER AIDED INSTRUCTION, *LEADERSHIP TRAINING, CONTRAST, ELEVATION, THRESHOLD EFFECTS, CHANNELS, HUMANS, GRAPHS, COMPUTER PROGRAMS, SPECTRA, SURFACES, TUNING, FILTERS, PROFILES, ELONGATION, LENGTH, RATIOS, WIDTH, DETECTION, MASKING, SIGNALS, FREQUENCY, SPATIAL DISTRIBUTION, DISK RECORDING SYSTEMS, INTERPERSONAL RELATIONS, SKILLS, VIDEO RECORDING

IDENTIFIERS: (U) VISTA(Videodisc Interpersonal Skills Training and Assessment), PE61102F, WUAFOSR2313A5

AD-A167 094 7/4 7/3

VIRGINIA INST OF MARINE SCIENCE GLOUCESTER POINT

(U) Water Solubility Behavior of Binary Hydrocarbon Mixtures.

85 8P

PERSONAL AUTHORS: Burris, David R. ; MacIntyre, William G. ;

REPORT NO. VIMS-1198

CONTRACT NO. AFOSR-83-0036

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0171

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Environmental Toxicology and Chemistry, v4 p371-377 1985.

ABSTRACT: (U) The aqueous solubility equilibrium behavior of seven medium molecular weight, liquid, binary hydrocarbon mixtures has been determined at 20 C. Binary hydrocarbon mixtures containing structurally similar compounds exhibited ideal solution behavior, but deviations from ideality by as much as a factor of 2.5 at 0.1 mole-fraction occurred with aromatic-aliphatic mixtures. The ratio of concentrations of hydrocarbon solutes appears to be independent of the degree of saturation of the binary hydrocarbon mixture with water. This independence implies that the equilibrium phenomena observed could be applicable under nonequilibrium conditions.

DESCRIPTORS: (U) *SOLUBILITY, *CHEMICAL EQUILIBRIUM, *WATER, *HYDROCARBONS, EQUILIBRIUM(GENERAL), LIQUIDS, MIXTURES, MOLECULAR WEIGHT, REPRINTS, NONEQUILIBRIUM FLOW, RATIOS, SOLUTES, SOLUTIONS(GENERAL), BEHAVIOR, AROMATIC HYDROCARBONS, ALIPHATIC HYDROCARBONS, SATURATION, BINARY COMPOUNDS, REPRINTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 093 7/4 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Quasi-Bound States of Coupled Morse Oscillators.

MAY 85 8P

PERSONAL AUTHORS: Benjamin, I. ; Bisseling, R. H. ; Kosloff, R. ; Levine, R. D. ; Manz, J. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0195

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v118 n4 p255-261, 10 May 85.

ABSTRACT: (U) Quasi-bound (resonance) states are present in the continuous spectrum of the Hamiltonian of two coupled Morse oscillators. Two different methods for approximating these as localized states are compared. The algebraic approach is shown to be in very good accord with the other method which is formulated in coordinate space and hence is differential in character. For these highly excited states an intermultiplet mixing term is included in the algebraic Hamiltonian. Keywords: Reprints; Quasi Bound states; Morse oscillators.

DESCRIPTORS: (U) *CONTINUOUS SPECTRA, *HAMILTONIAN FUNCTIONS, *OSCILLATORS, ALGEBRA, APPROACH, COUPLING/INTERACTION, MORSE CODE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A167 092 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) The D(0 (+ u)) State of I2: Analysis by Quantum Simulations of Bond-Free D Yields X Fluorescence.

B4 9P

PERSONAL AUTHORS: Tellinghuisen, Joel ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0212

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Canadian Jnl. of Physics, v62 p1933-1940 1984.

ABSTRACT: (U) The McLennan bands of I2 represent the highly structured diffuse emission from high v' levels of ion-air D state to the vibrational continuum of the ground state. A variety of existing data are analyzed together with quantum simulations of D to X spectra to yield an improved description of the D state, including an estimate of the internuclear distance, R=3.5756 Å or - 0.015 Å, and a determination (within a unit) of the vibrational numbering of v' levels accessed in D from X absorption at room temperature. Keywords: Emission; Ion pair vibrational continuum spectra; Quantum; Simulations; Iodine; Reprints.

DESCRIPTORS: (U) *IODINE, *VIBRATIONAL SPECTRA, *MOLECULAR VIBRATION, DIFFUSION, EMISSION, GROUND STATE, REPRINTS, ROOM TEMPERATURE, SIMULATION, QUANTUM CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 090 9/3

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) Combining Component and System Information in System Reliability Calculation.

85 9P

PERSONAL AUTHORS: Barlow, R. E. ;

CONTRACT NO. AFOSR-81-0122

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0169

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probabilistic Methods in the Mechanics of Solids and Structures, p375-383 1984.

ABSTRACT: (U) In system reliability prediction, one of the most difficult problems (especially if the classical statistics approach is used) is to combine component and system failure data. Asymptotic and approximate methods to calculate classical confidence intervals on system reliability continue to be produced each year. However, since classical confidence intervals do not produce a probability for system survival conditional on data, they cannot provide the basis for action in the decision theory sense. Since the Bayesian Approach does provide a means for producing a probability for system survival, conditional on data, which can be used for decision, this reprint concentrates on this approach.

DESCRIPTORS: (U) *RELIABILITY(ELECTRONICS), *MATHEMATICAL PREDICTION, BAYES THEOREM, COMPUTATIONS, CONFIDENCE LEVEL, CONFIDENCE LIMITS, FAILURE, INTERVALS, PREDICTIONS, REPRINTS, STATISTICS, SURVIVAL(GENERAL), SYSTEMS ANALYSIS

IDENTIFIERS: (U) PEG1102F

AD-A167 090

AD-A167 089 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Extension of Ito's Calculus via Malliavin Calculus.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 26P

PERSONAL AUTHORS: Ustunel, A. S. ;

REPORT NO. TR-128

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0219

UNCLASSIFIED REPORT

ABSTRACT: (U) This work is devoted to the development of the Ito's calculus for a class of functionals defined on the Wiener space which are more general objects than semimartingales. In doing this, we begin by an extension of the Ito formula for finite dimensional hypoelliptic Ito processes to the tempered distributions. Watanabe has defined the composition of a tempered distribution by a hypoelliptic Wiener functional with the help of the Malliavin Calculus. Here we go a little further and give an Ito formula by using the same method. Let us note that when the Ito process is the standard Wiener process, the Ito formula has already been extended to the tempered distributions with the use of the Hida calculus; we give here a different approach which works for more general processes than the standard Wiener process. In the extended Ito formula, the Lebesgue integral part can be interpreted as a Bochner integral in some Sobolev space on the Wiener space and the notations; however the remaining part is not an ordinary stochastic integral, despite the fact that it corresponds to a functional in some Sobolev space on the Wiener space. This situation suggests an extension of the Ito stochastic integral to the objects which are not necessarily stochastic processes.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 089 CONTINUED

DESCRIPTORS: (U) CALCULUS, STOCHASTIC PROCESSES,
INTEGRALS, DISTRIBUTION
IDENTIFIERS: (U) Ito's calculus, Malliavin calculus,
PE61102F

AD-A167 088 5/1

B-K DYNAMICS INC ROCKVILLE MD

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

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

AUG 85 136P

PERSONAL AUTHORS: McDermott, Patrick P. ;

REPORT NO. BKD-TR-5-763

CONTRACT NO. F49620-84-C-0099

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0230

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this effort was to review Air Force research and existing emerging technologies lists, to conduct interviews and analyze data in order to identify likely candidates for a Military Emerging Technologies Awareness List (METAL). A METAL was constructed, in consultation with AFOSR, based on original research and interview data. The contract effort consisted of 3 stages: 1) Preparation of a Preliminary Militarily Significant Emerging Technologies List (MSET) from 3 existing Air Force emerging technologies lists. 2) In-depth Interviews at 6 Air Force Laboratories covering 70 topical areas. Technologies were identified, based on criteria outlined in Stage 1, as Mature Technologies, Emerging Technologies, or MSETs. If technologies could be correlated to those in the Militarily Critical Technologies List (MCTL), they were designated as Militarily Critical Technologies (MCTs). Interviews provided discussion of a technology's military significance and sensitivity to public release, and 3) Assessment of Interview Results identified the preliminary METAL, and identified the importance of the interview process in ultimately determining the MSETs. Further efforts are to continue to identify, review, and finalize the Air Force METAL. Keywords: Emerging

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 088 CONTINUED

technologies, Military Significant Emerging Technologies (MSET), Air Force technologies, and Air Force programs.

DESCRIPTORS: (U) *TECHNOLOGY FORECASTING, *RESEARCH MANAGEMENT, AIR FORCE, AIR FORCE RESEARCH, CRITICALITY(GENERAL), IDENTIFICATION, INTERVIEWING, TABLES(DATA), TEST AND EVALUATION, AIR FORCE PLANNING

IDENTIFIERS: (U) *Emerging technologies, METAL(Military Emerging Technologies Awareness List), MSET(Militarily Significant Emerging Technologies), MCT(Militarily Critical Technologies), PE61102F, WUAFOSR2303A3

AD-A167 087 20/5 20/8

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF PHYSICS

(U) Coherent Extreme Ultraviolet Generation and Surface Studies Using Ultraviolet Excimer Lasers.

DESCRIPTIVE NOTE: Final rept. 15 Jul 84-31 Jan 85.

FEB 86 129P

PERSONAL AUTHORS: Rhodes, Charles K. ;

CONTRACT NO. AFOSR-83-0365

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-0168

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research program is the development of coherent X-ray sources in the kilovolt range. An initial application of short wavelength radiation in the vacuum ultraviolet region for photoemission studies of GaAs surfaces has been performed demonstrating the feasibility of this class of experiments. A basic and long-standing problem in the field of coherent sources is that associated with the generation of coherent energy in the extreme ultraviolet and soft x-ray regions. During the last three years, picosecond rare gas halogen (RGH) excimer laser technology, on account of the very favorable scaling relationships governing the spectral brightness of these sources, has emerged as a key factor in new techniques useful for generation of coherent radiation below 100 nm. The operation of RGH systems will be extended down into the femtosecond region, a development that will enable sources with peak powers P in the $1\text{TW} < \text{or} = 10\text{TW}$ range to be used in physical studies. Light sources of this kind should permit the generation of focal intensities above approx 10 to the 20th power S/cc.

DESCRIPTORS: (U) *EXCIMERS, *ULTRAVIOLET LASERS, *LASER PUMPING, *X RAY TUBES, BRIGHTNESS, COHERENCE, ENERGY, HALOGENS, LONG RANGE(TIME), PHOTOELECTRIC EMISSION, PHYSICAL PROPERTIES, RARE GASES, SHORT WAVELENGTHS, SOFT

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 087 CONTINUED

X RAYS. SOURCES. X RAYS. FAR ULTRAVIOLET RADIATION
IDENTIFIERS (U) Femtosecond time. Rare gas halogen
lasers. PE61102F. WUAFOSR2301A1

AD-A167 086 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Three-Dimensional Shock Wave and Turbulent Boundary
Layer Interactions

DESCRIPTIVE NOTE: Final rept. 1 Aug 81-31 Jul 84.

SEP 85 75P

PERSONAL AUTHORS: Bogdonoff, Seymour M.

REPORT NO 1723 MAE

CONTRACT NO F49620-81-K-0018

PROJECT NO 2307

TASK NO A1

MONITOR AFOSR
TR 85-1242

UNCLASSIFIED REPORT

ABSTRACT (U) An extensive experimental study of three-dimensional shock wave turbulent boundary layer interactions caused by shock generators defined solely by angles has been carried out at Mach 3. Sharp fins, sharp swept fins, swept wedges, and semi-cones have been used to generate a wide range of shock waves. The interaction of these waves with turbulent boundary layers has been investigated by surface flow visualization, mean surface static pressure distributions, flowfield surveys of total pressure and yaw, and several flowfield visualization techniques. Some exploratory high frequency surface pressure measurements have been carried out to evaluate the steadiness of these interactions. Scaling laws for both surface and flowfield features have been derived. Some limited studies were carried out at a Mach number of 2. A flowfield study has shown that the initial part of interactions caused by the same strength and geometrical shock wave generated by different shock generators are all similar. The 'footprints' of the interactions, as shown by surface flow visualization, can be categorized as approximately conical or cylindrical, and the boundaries between these two regions have been defined for both Mach 3 and Mach 2. There are still questions

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 086 CONTINUED

with regards to the detailed flowfield structures and physical mechanisms, but the three-dimensional interactions appeared to be less unsteady than that of two-dimensional separated flows.

DESCRIPTORS: (U) *INTERACTIONS, *TURBULENT BOUNDARY LAYER, *SHOCK WAVES, FINS, FLOW FIELDS, FLOW SEPARATION, FLOW VISUALIZATION, GEOMETRY, LIMITATIONS, RANGE(EXTREMES), SCALING FACTORS, SHARPNESS, STRUCTURES, SURFACES, THREE DIMENSIONAL, TWO DIMENSIONAL FLOW, YAW, WEDGES, MACH NUMBER, SUPERSONIC CHARACTERISTICS, PRESSURE MEASUREMENT, SWEEP WINGS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2307A1

AD-A167 085 20/6 7/4

MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY

(U) Coherent Scattering of Light by Crystals

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

MAR 85 7P

PERSONAL AUTHORS: Weber, J. ;

CONTRACT NO. AFOSR-82-0164

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-86-0239

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with California Univ., Irvine.

ABSTRACT: (U) For the past several years we have been studying coherent scattering of red light from a Helium Neon Laser, by sapphire and lithium fluoride crystals. The theory has been presented in earlier proposals, and reports. This theory has been presented in earlier proposals, and reports. This theory predicts that nearly perfect crystals with nuclei having magnetic moments, will absorb light by a collective spin state change. Thus many nuclei change their spin state in a magnetic field, absorbing a single red photon. Experiments have been carried out at liquid helium temperatures, in which light from a helium neon laser interacts with nuclear spins in a crystal. Collective absorption of photons by the spin system is observed, if the spins are polarized by a magnetic field, and appropriate polarized light employed.

DESCRIPTORS: (U) *COHERENT SCATTERING, *MAGNETIC MOMENTS, *NUCLEAR SPINS, *LIGHT SCATTERING, *LASER BEAMS, *SPIN STATES, CRYSTALS, HELIUM NEON LASERS, LIGHT, LIQUID HELIUM, LITHIUM FLUORIDES, MAGNETIC FIELDS, PHOTONS, POLARIZATION, RED(COLOR), SAPPHIRE, RADIATION ABSORPTION, ENERGY TRANSFER

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 085 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8

AD-A167 079 5/10 6/3

OREGON STATE UNIV CORVALLIS

(U) Neuronal Basis of Learning.

DESCRIPTIVE NOTE: Final rept. 10 Oct 83-1 Sep 86.

MAR 86 9P

PERSONAL AUTHORS: Moitsos, George J. ;

CONTRACT NO. F49620-83-C-0063

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-86-0217

UNCLASSIFIED REPORT

ABSTRACT: (U) Our studies on the relatively simple nervous systems of the molluscs Pleurobranchaea and Aplysia have inquired into the neuronal basis of integrated behavior, the effect of learning on such integration, identification of neurons involved in the learned behavior, and small network modeling of learning. Significant findings are: 1) Neurocircuits establishing whole-animal behavior functionally emerge or self-organize within pools of coactive neurons; i.e., functional neurocircuits arise more so from nonlinear dynamical properties than from static (switchboard) anatomical ones. 2) Pharmacologic antagonists of cholinergic muscarinic receptors enhance one-trial Pavlovian conditioning. The specificity of this effect on associative processes provides an important inroad for experiments aiming to identify neurons involved in learning, and also to understand how learning biases self-organization. 3) In support of a goal-seeking theory of learning, conditioning of small nerve networks shows that cellular changes relating to an analog of learning involve postsynaptic processes in addition to presynaptic ones. These findings have broad implications in neurosciences and artificial intelligence. Keywords: Associative learning, Parallel processing, Self organization, Pavlovian conditioning, Muscarinic receptors, Cholinergic, Identified neurons, Distributed function, Nerve nets.

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AD-A167 067 7/4 20/13

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

DESCRIPTORS: (U) *LEARNING, *NERVE CELLS, *NEUROPHYSIOLOGY, ANALOG SYSTEMS, ARTIFICIAL INTELLIGENCE, ASSOCIATIVE PROCESSING, BEHAVIOR, CHOLINERGIC NERVES, DISTRIBUTION, DYNAMICS, FUNCTIONS, INTEGRATED SYSTEMS, MODELS, MUSCARINE, NERVOUS SYSTEM, NETWORKS, NEUROLOGY, NONLINEAR SYSTEMS, PARALLEL PROCESSING, RECEPTION, SENSE ORGANS, SWITCHBOARDS, THEORY, NEURAL NETS, CONDITIONING(LEARNING), MOLLUSCA

(U) Evidence for Phase Space Transitions in Excited Triatomic Molecules.

MAR 85 7P

PERSONAL AUTHORS: Benjamin, I. ; Alhassid, Y. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0194

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v115 n2 p113-118, 29 Mar 85.

ABSTRACT: (U) At high levels of vibrational excitation is not realistic to examine the energy levels of molecules state by state. A more coarse grained measure is required. The use of the free energy is illustrated by application to a realistic model Hamiltonian for the stretch vibrations of triatomic molecules. Both exact and variational (self-consistent) computations are reported. A transition from a localized to an equipartitioned distribution of energy (as a function of mean excitation energy) is noted and discussed. The state of a system of two coupled anharmonic oscillators has been described by a density matrix using a realistic Hamiltonian. Both analytical and computational results showing that the density matrix undergoes a qualitative change as a function of the temperature have been presented. The excitation can be localized preferentially in one bond at low temperatures but is equally partitioned amongst both bonds at high temperatures. The ratio of the coupling of the two bonds to the anharmonicity of the bond determines the temperature of the transition. The Hamiltonian used does have a good constant of the motion, P , the sum of the vibrational quanta in the two modes. (Reprints)

DESCRIPTORS: (U) *POLYATOMIC MOLECULES, *HAMILTONIAN FUNCTIONS, *ANHARMONIC OSCILLATORS, *MOLECULAR VIBRATION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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COMPUTATIONS, CONSTANTS, COUPLING(INTERACTION),
DISTRIBUTION, ENERGY, ENERGY LEVELS, EXCITATION, FREE
ENERGY, HIGH TEMPERATURE, MEAN, MOLECULES, MOTION,
OSCILLATORS, RATIOS, REPRINTS, TRANSITIONS, THERMAL
PROPERTIES, CHEMICAL BONDS

IDENTIFIERS: (U) Density matrix, Partition functions,
PE61102F

AD-A167 066 7/4 9/1

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Effect of Surface Roughness on the Adsorption,
Orientation and Anodic Oxidation of Hydroquinone at
Platinum Electrodes.

84 9P

PERSONAL AUTHORS: White, James H. ; Soriaga, Manuel P. ;
Hubbard, Arthur T. ;

CONTRACT NO. AFOSR-85-0192

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0202

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical
Chemistry, v177 p89-96 1984.

ABSTRACT: (U) Adsorption and anodic oxidation of
hydroquinone (HQ) have been studied at platinum thin-
layer electrodes purposely roughened by platinization or
abrasion. The concentration-dependent packing density
transition observed for HQ at smooth surfaces diminished
as the surface roughness was increased. Beyond a
roughness factor about 5, the transition had essentially
vanished. Taken together, the absorption and oxidation
data suggest that the suppression of the packing density
transitions by surface roughness arises from inhibition
of adsorption in the vertical orientation. The results
help account for the fact that packing density
(orientational) transitions were not reported in studies
using extensively platinized Pt surfaces. Surface
roughness effects are attributable to breakdown of
cooperative adsorption/reorientation phenomena, and
disruption of optimum conditions for stable bridge-
bonding in the edgewise orientation. Mechanical polishing
and electrochemical etching decreased surface roughness
appreciably but did not produce smoothness comparable to
high-temperature annealing.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *PHENOLS, *SURFACE

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

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CHEMISTRY, *SURFACE ROUGHNESS, ABRASION, ADSORPTION, ANNEALING, ANODIC COATINGS, ELECTRODES, ETCHING, HIGH TEMPERATURE, INHIBITION, LAYERS, MECHANICAL WORKING, METALLIZING, OPTIMIZATION, OXIDATION, PACKING DENSITY, PLATINUM, POLISHING, ROUGHNESS, THIN FILMS, TRANSITIONS, ORIENTATION(DIRECTION), REPRINTS

IDENTIFIERS (U) Hydroquinone, PE61102F

AD-A167 065 20/13

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Diatomic Partition Functions from Semiclassical Phase Integrals.

NOV 83 7P

PERSONAL AUTHORS: Tellinghuisen, Joel :

CONTRACT NO AFOSR-83-0110

PROJECT NO 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0210

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v102 n1 p4-9, 11 Nov 83

ABSTRACT: (U) In statistical mechanics the tradition starting point for evaluating the internal partition function $q_{\text{sub vr}}$ of a diatomic molecule is the combination of the rigid-rotor model for rotation and the harmonic oscillator for vibration. The rigid-rotor/harmonic oscillator (RR/HO) partition function may then be corrected for effects of anharmonicity and vibration-rotation interaction through approximations which are quite reliable for temperatures low enough that only the first few vibrational levels contribute significantly to $q_{\text{sub vr}}$. However, as k it becomes necessary to include levels beyond the range of validity of these approximations. Diatomic rotation-vibration partition functions are evaluated through a technique which utilizes semiclassical phase integrals to estimate the eigenvalues. For the assessment of the contributions from the bound and metastable levels, the method is computationally efficient and virtually exact for any potential at any temperature.

DESCRIPTORS: (U) *HARMONIC GENERATORS, *STATISTICAL MECHANICS, *OSCILLATORS, *MOLECULAR ROTATION, DIATOMIC MOLECULES, EIGENVALUES, INTEGRALS, INTERNAL, METASTABLE STATE, VIBRATION, APPROXIMATION(MATHEMATICS), CHEMICAL BONDS, REPRINTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK55I

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IDENTIFIERS: (U) *Harmonic oscillators, *Partition functions, RR/HO(Rigid Rotor/ Harmonic oscillator), PE61102F

AD-A167 064 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Surprisal Analysis Derived from a Variational Principle for Mechanical Systems,

JUL 83 6P

PERSONAL AUTHORS: Tishby, N. Z. ; Levine, R. D. ;

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-0184

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v9, n4 p310-314, 1 Jul 84.

ABSTRACT: (U) The expansion of the surprisal in one or few observables is derived from a variational (action) principle for hamiltonian systems. Whenever phenomenological sum rules exist or 'slow' variables can be identified on physical grounds, the variational approximation will be accurate and a hamiltonian-like formalism for the description of the collision in terms of a few variables is sufficient. The proposed formalism is applied both as an analytical and as a numerical (i.e. computational) tool. Space limitations require that the details be given elsewhere. The results thus far lead us to believe that the approach is useful not only in providing insight and guidance for surprisal analysis but also in specifying a hamiltonian like formalism for the dynamics using a few relevant variables. (Reprints)

DESCRIPTORS: (U) *HAMILTONIAN FUNCTIONS, *VARIATIONAL PRINCIPLES, COLLISIONS, DYNAMICS, LIMITATIONS, MECHANICAL COMPONENTS, REPRINTS, SPACE(ROOM)

IDENTIFIERS: (U) Sum rules, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A167 063 CONTINUED

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) NMR Study of Disordered Materials under Extreme
Conditions of Pressure and Temperature.

MATERIALS, MICROSCOPY, MOLECULAR STATES, MOLECULES,
MOTION, POLARIZATION, POLYETHYLENE, PRESSURE, SHEAR
PROPERTIES, TEMPERATURE, VISCOSITY, VOLUME,
CRYSTALLOGRAPHY, LIQUID CRYSTALS, IONIC CRYSTALS

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

IDENTIFIERS: (U) Smectic phase, PE61102F

FEB 86 20P

PERSONAL AUTHORS: Jonas, Jiri ;

CONTRACT NO. AFOSR-81-0010

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0204

UNCLASSIFIED REPORT

ABSTRACT: (U) A new NMR method for measuring the crystallization kinetics of polymers under high pressure, sensitive on a molecular scale to the dynamics of chain motion, was developed. The very rapid formation of extended chain crystals of polyethylene was directly observed. The technique has much promise for future experiments including polymer crystallization, melting and annealing. Polarization microscopy and NMR experiments on various alkali salts of alkalicarboxylates elucidated the dynamic structure of the smectic phase of these interesting ionic liquid crystalline materials. Experiments on highly viscous liquids explained the origin of the anomalous discontinuity observed in the temperature dependence of the shear viscosity of glass forming liquids. Molecular level interpretation of the coupling between translational and rotational motions in viscous liquids was achieved. The Debye and Stokes-Einstein equations were found to be applicable at the molecular level in viscous liquids. Volume effects were shown to be important for dynamics of viscous liquids.

DESCRIPTORS: (U) *SALTS, *CRYSTALLIZATION, *POLYMERS,
*ORDER DISORDER TRANSFORMATIONS, *CRYSTAL STRUCTURE,
*NUCLEAR MAGNETIC RESONANCE, ALKALI METAL COMPOUNDS,
ANNEALING, ANOMALIES, CHAINS, CRYSTALS, DISCONTINUITIES,
DYNAMICS, GLASS, HIGH PRESSURE, KINETICS, LIQUIDS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 062 9/3
 CLEMSON UNIV SC DEPT OF MATHEMATICAL SCIENCES
 (U) Algorithms for Generating Minimal Cutsets by Inversion,
 OCT 85 7P
 PERSONAL AUTHORS: Shier, Douglas R. ; Whited, David E. ;
 CONTRACT NO. AFOSR-84-0154
 PROJECT NO. 2304
 TASK NO. A5
 MONITOR: AFOSR
 TR-86-0218

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
 Reliability, VR-34 n4 p314-319 Oct 85.

ABSTRACT: (U) One approach to the calculation of two-
 terminal reliability in coherent systems involves the
 specification of minimal cutsets for the system. This
 reprint studies the problem of inverting minimal paths to
 obtain minimal cutsets (or vice versa) for coherent
 systems. The theoretical results lead to simplified
 inversion by a sequential method. Strategies are
 discussed for implementing these simplifications
 efficiently. Computational results, obtained by applying
 the algorithms to standard problems drawn for the
 literature, indicate that a substantial reduction in
 computational effort can be achieved by such
 simplifications. Keywords: Systems reliability. (Author)

DESCRIPTORS: (U) *ALGORITHMS, *RELIABILITY(ELECTRONICS),
 *COMPUTATIONS, COHERENCE, INVERSION, SEQUENCES,
 SIMPLIFICATION, REPRINTS

IDENTIFIERS: (U) PE61102F

AD-A167 061 20/4 12/1
 STANFORD UNIV CA APPLIED MATHEMATICS GROUP
 (U) Mathematical Problems of Nonlinear Wave Propagation
 and of Waves in Heterogeneous Media.
 DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.
 MAR 85 19P
 PERSONAL AUTHORS: Keller, Joseph B. ;
 CONTRACT NO. AFOSR-79-0134
 PROJECT NO. 2304
 TASK NO. A4
 MONITOR: AFOSR
 TR-86-0163

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Results were obtained on the reflection of
 waves from rough boundaries. Novel features are the
 calculation of second moments of the scattered field and
 the relation of the results to those of Tversky. In
 addition the effective viscosity tensor of a periodic
 suspension and the effective elasticity tensor of a
 periodic composite were calculated for all concentrations
 up to close packing. The acoustoelastic effect has also
 been analyzed. Various new results on inverse scattering
 have been obtained in two and three dimensions. Keywords:
 Nonlinear waves; Heterogeneous media; Reciprocal theorems;
 and Effective parameters.

DESCRIPTORS: (U) *NONLINEAR PROPAGATION ANALYSIS, *WAVE
 PROPAGATION, COMPUTATIONS, ELASTIC PROPERTIES,
 HETEROGENEITY, INVERSE SCATTERING, MEDIA, MOMENTS,
 REFLECTION, SCATTERING, SUSPENSION DEVICES, TENSORS,
 THEOREMS, VISCOSITY, PACKING DENSITY

IDENTIFIERS: (U) Reciprocity theorem, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A167 060 20/6 6/4

AD-A167 060 CONTINUED

FLORIDA UNIV GAINESVILLE DEPT OF NUCLEAR ENGINEERING
SCIENCES

IDENTIFIERS: (U) *Multiaperture optics, PE61102F

(U) Multiaperture Optics.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-14 Jan 86.

MAR 86 81P

PERSONAL AUTHORS: Schneider, Richard T. ;

CONTRACT NO. AFOSR-84-0304

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-0233

UNCLASSIFIED REPORT

ABSTRACT: (U) The basic principles of Multiaperture Optics are discussed. Based on the results generated under this program, certain applications for multiaperture optics were identified. The main features of an optical instrument based on the multiaperture principle are, that such a sensor will necessarily have to be small, and need to be a mass product. Large scale integration would have to be used to evaluate data collected and perform pattern recognition. It is a necessity to perform these functions in the sensor itself, using parallel input into the circuitry and experimental device has been built and tested. It is capable of recognizing simple shapes. The development of optical instruments, at least the photographic camera, was undoubtedly inspired by the then existing knowledge of the anatomy of the human eye, therefore it is probably appropriate to try this approach again for the development of a new type of optical instrument based on the design of the insect eye. A brief description is given of the anatomy of the insect eye and an instrument is designed using similar components.

DESCRIPTORS: (U) *EYE, *OPTICAL INSTRUMENTS, *OPTICAL PROCESSING, ANATOMY, APERTURES, CAMERAS, INPUT, INSECTS, INTEGRATION, MASS, OPTICS, PARALLEL PROCESSORS, PATTERN RECOGNITION, PHOTOGRAPHY, SHAPE

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAF0SR23031

(U) The Geometrical Classical Limit of Algebraic Hamiltonians for Molecular Vibrotational Spectra.

NOV 83 7P

PERSONAL AUTHORS Van Rossmalen O. S. (Levine, R. D.)
Diepenink A. E. L.

CONTRACT NO AFOSR 81 0030

PROJECT NO 2303

TASK NO 81

MONITOR AFOSR
TR 46 0185

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE Pub in Chemical Physics Letters,
v101 n6 p512-517 4 Nov 83

ABSTRACT (U) A classical limit, which is amenable to a geometrical interpretation, is discussed for the vibron model of molecular vibrotational spectra. Both diatomic and triatomic molecules are considered. An example of a coupling between the two stretching modes of a linear triatomic is examined in detail. Examination of the algebraic hamiltonian in terms of classical variables provides additional insight on the nature of the coupling and their geometrical significance. Work is in progress on other types of couplings in the $U(2) \times U(2)$ case and on the extension of the present results to $U(4) \times U(4)$. In the latter case, even after elimination of the constants of the motion related to the $O(4)$ symmetry, the phase space is four dimensional. The resulting classical trajectories need not then be simple. Additional effects are also expected due to the role of the bending vibration. (Reprint)

DESCRIPTORS (U) *HAMILTONIAN FUNCTIONS, *MOLECULAR VIBRATION, *MOLECULAR ROTATION, *VIBRATIONAL SPECTRA, ALGEBRA, BENDING, DIATOMIC MOLECULES, LIMITATIONS, POLYATOMIC MOLECULES, REPRINTS, TRAJECTORIES, COUPLING, INTERACTION)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A167 023 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION
AND DECISION SYSTEMS

(U) Layer Stripping Solutions of Inverse Seismic Problems.

DESCRIPTIVE NOTE: Technical rept.,

MAR 85 757P

PERSONAL AUTHORS: Yagle, Andrew E. ;

REPORT NO. LIDS-TH-1436

CONTRACT NO. AFOSR-82-0135, DAAG28-84-K-0005

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR 86-0249

reflection response. None of these algorithms has appeared previously in the literature. Computer runs of some of these algorithms are included. Several procedures for improving their performance on noisy data are given. Some results on general inverse scattering theory, and relations between these fast algorithms and fast algorithms that exploit structure in matrices or the kernels of integral equations, are presented.

DESCRIPTORS: (U) *INVERSE SCATTERING, *SEISMIC WAVES, *SIGNAL PROCESSING, ABNORMALITIES, ACOUSTICS, ALGORITHMS, COMPUTERS, DEPTH, ELASTIC PROPERTIES, EXCITATION, HARMONICS, INVERSION, LAYERS, MEDIA, PLANE WAVES, PULSES, REFLECTION, RESPONSE, SCATTERING, SOURCES, THEORY, WAVEFRONTS, YIELD, THESES

IDENTIFIERS: (U) *Layer stripping(Signal processing), *Inverse scattering, PE61102F, WUAFOSR2304A1

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT. (U) The inverse scattering theory concept of layer stripping is applied to a variety of inverse seismic problems. This results in fast algorithms that solve these problems more simple and quickly than techniques used previously on these problems, and also admit physical insight into their operation. A layer stripping algorithm works by recursively identifying and stripping away differential layers of the medium. As the wave front of the excitation passes through a given depth z , the first non zero value of the medium response at depth z yields information about the medium at depth z . Then the excitation and response can be propagated through the known differential layer at depth z to depth $z + \Delta z$, where the process is repeated. The inverse seismic problems for which layer stripping fast algorithm solutions are obtained include: the reconstruction of layered acoustic and elastic media from their reflection responses to impulsive plane waves at non normal incidence, the reconstruction of a layered acoustic medium from its reflection response to a point impulsive or harmonic source, and the reconstruction of a two dimensional inhomogeneous medium from its plane wave

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

AD A167 015 7/3 11/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Organosilicon Compounds and Organosilicon Polymer Intermediates.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Jun 85.

DEC 85 10P

PERSONAL AUTHORS: Seyferth, Dietmar ;

CONTRACT NO. AFOSR-83-0003

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0236

UNCLASSIFIED REPORT

ABSTRACT: (U) A. The sodium condensation of $\text{CH}_3\text{SiHCl}_2$ has been studied. It gives products of type $(\text{CH}_3\text{SiH})_x(\text{CH}_3\text{Si})_y$ in which are not useful precursors for SiC. b. Base-catalyzed reorganization of the polysilanes in (a) gives new materials whose pyrolysis gives markedly higher ceramic yields. c. Useful preceramic hybrid polymers are obtained by the reaction of the polysilanes in (a) with a poly (silylamide) of type $(\text{CH}_3\text{SiH}_2\text{NH})_n(\text{CH}_3\text{SiH}_2)_m(\text{CH}_3\text{SiH})_k$. d. This hybrid polymer approach also is useful in upgrading the Yajima polycarbosilane. e. The polysilanes of (a) also may be converted to useful preceramic materials by reaction with poly(vinyl) compounds, notably cyclo- $(\text{CH}_2-\text{CH}(\text{CH}_3)-\text{NH})_3$. Keywords: Preceramic polymers; Organosilicon chemistry; Silicon carbide; and Silicon nitride.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *POLYSILANES, CHEMISTRY, HYBRID SYSTEMS, MATERIALS, ORGANIC COMPOUNDS, POLYMERS, PYROLYSIS, RESPONSE, SILICON CARBIDES, SILICON COMPOUNDS, SILICON NITRIDES, VINYL PLASTICS, YIELD

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

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AD-A167 008 14/2 7/4 20/12 20/2

CINCINNATI UNIV OH SOLID STATE ELECTRONICS LAB

(U) Raman Spectrometer with Microprobe Capability.

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

JAN 86 13P

PERSONAL AUTHORS: Boyd, J. T. ; Jackson, H. E. ;

CONTRACT NO. AFOSR-84-0287

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-86-0156

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the results of this equipment grant funded as a part of the Department of Defense (DOD) University Research Instrumentation Program. This grant funded the purchase of a Raman spectrometer with microprobe capability having resolution of 1.0 micron. This report describes the equipment selecting decision, the configuration of the instrument selected, and some experimental results. The experimental results include Raman spectra used in characterization of laser recrystallized silicon and ion implanted regions in semi-insulating GaAs. The Raman microprobe can be used to characterize the effects of substrate temperature, beam power density and shape, beam scan speed and direction, deposition rate, substrate seeding, and polysilicon encapsulation schemes both near and away from grain boundaries. The frequency shift and the peak width of the Raman scattering from the triply degenerate zone center phonon in Si allow determination of the strain in the grains of laser recrystallized polysilicon. Reducing these strains will allow us to achieve large single grains of device quality.

DESCRIPTORS: (U) *MICROPROBES, *GALLIUM ARSENIDES, *INFRARED SPECTROMETERS, *CRYSTAL STRUCTURE, CONFIGURATIONS, DENSITY, DEPOSITION, DETERMINATION, ENCAPSULATION, FREQUENCY SHIFT, GRAIN BOUNDARIES, INSTRUMENTATION, ION IMPLANTATION, LIGHT SCATTERING, PEAK

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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VALUES, PHONONS, POLYSILICONS, POWER, RAMAN SPECTRA,
RAMAN SPECTROSCOPY, RATES, REGIONS, SEEDING, SILICON,
STRAIN(MECHANICS), SUBSTRATES, TEMPERATURE, WIDTH, LASER
APPLICATIONS, GRAIN SIZE

IDENTIFIERS: (U) *Raman spectrometers, PEB1102F

AD-A166 999 6/16 5/10

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Rapid Motion Aftereffect Seen within Uniform
Flickering Test Fields,

JUL 83 4P

PERSONAL AUTHORS: Green, M. ; Chilcoat, M. ; Stromeyer, C. F. .
III ;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0245

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Nature, v303 n5921 p61-62, 7
Jul 83.

ABSTRACT: (U) Prolonged viewing of a moving pattern selectively elevates the threshold for a pattern moving in the same direction and induces the classical motion aftereffect (MAE). The aftereffect is seen as a slow drift in the opposite direction, which is visible even with the eyes shut or while viewing a uniform field. However, as we report here, a strikingly different aftereffect is seen when the test field is uniform and sinusoidally flickered; the field is filled with rapid motion in the direction opposite the adapting motion. This flicker MAE has distinct properties: the adapting grating must be of low spatial frequency; the effect is promoted by high contrast and high temporal frequencies of both adapting and test stimuli; and the aftereffect does not transfer interocularly. In all these respects the flicker MAE differs from the traditional MAE. Motion detectors have been identified in human vision by the threshold detectability and discriminability of moving patterns and by selective adaptation. The flicker MAE selectively taps a class of transient motion mechanisms that are selective for rapid motion and low spatial frequency. Uniform flicker is an effective stimulus for these mechanisms. It thus appears that the human visual system contains at least two distinct classes of

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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mechanisms for sensing motion Keywords: Visual motion
aftereffects; and Visual flicker.

DESCRIPTORS (U) *VISION, *THRESHOLD EFFECTS, *SPACE
PERCEPTION, *FLICKER, DETECTORS, EYE, LOW FREQUENCY,
MOTION, PATTERNS, SPATIAL DISTRIBUTION, DETECTION,
STIMULI, TRANSIENTS, HUMANS, CONTRAST, LONG RANGE(TIME),
HIGH VELOCITY, ADAPTATION, REPRINTS

IDENTIFIERS: (U) Aftereffects(Physiology), PE61102F

AD-A166 998 7/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Laser Kinetic Spectroscopy of Unimolecular and
Bimolecular Processes in the Gas Phase.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Sep 85.

NOV 85 14P

PERSONAL AUTHORS: Wittig,Curt ;Reisler,Hanna ;

CONTRACT NO. AFOSR-83-0022

PROJECT NO. 2301

TASK NO. B1

MONITOR: AFOSR
TR-86-0226

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is concerned with the study
of unimolecular processes in the gas phase. We
concentrated on simple bond fission reactions, and
determined both the collision free unimolecular rates
Benzylamine ($C_6H_5CH_2NH_2$), Nitrosomethane (CH_3NCNO), and
the energy disposal in the products Nitrosyl cyanide
($NCNO$), Trifluoronitrile methane (CF_3CN), Cyanogeniodide
(ICN). Most of the molecules were dissociated either via
IRMPD(CF_3CN , $C_6H_5CH_2NH_2$) or by electronic excitation
followed by radiationless transitions ($NCNO$)(CH_3NCNO)
They exhibited statistical behavior, and the results were
compared with the predictions of statistical theories
The most detailed experiments involved the
photodissociation of $NCNO$, which provided complete
mapping of product internal states. The CN and NO E.V.R
distributions are textbook examples of statistical
product state distributions deriving from a unimolecular
reaction. In our studies of the direct photodissociation
of ICN , we obtained sub-Doppler LIF spectra of nascent
 $CN(X^2 \text{ sigma}^+ \text{ state})$, following the 266 nm photolysis of
300 K molecules. These studies provided a detailed
picture of the fragment recoil spatial anisotropies as
well as CN E.V.R. I and I/I excitations. The CN
rotational distributions were dissected into two separate
distributions for the channels producing I and I.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

AD-A166 998 CONTINUED

DESCRIPTORS: (U) *PHOTOLYSIS, *PHOTODISSOCIATION, *REACTION KINETICS, *NITRILES, *AMINES, CYANIDES, DISPOSAL, ELECTRONS, ENERGY, EXCITATION, NITROSO COMPOUNDS, PREDICTIONS, RADIATION, RESPONSE, SPECTROSCOPY, STATISTICAL ANALYSIS, STATISTICAL DISTRIBUTIONS, STATISTICS, TRANSITIONS, VAPOR PHASES, FLUORINATED HYDROCARBONS, IODIDES, BENZYL RADICALS, LASER APPLICATIONS, LASER PUMPING, EMISSION SPECTROSCOPY

IDENTIFIERS: (U) Cyanide/nitrosyl, Methane/trifluoronitrile, Iodide/cyanogen, Methane/nitroso, Amine/benzyl, PE61102F

AD-A166 996 6/4 5/8 6/16

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Six Formal Properties of Two-Dimensional Anisotropic Visual Filters: Structural Principles and Frequency/Orientation Selectivity.

OCT 83 9P

PERSONAL AUTHORS: Daugman, John G. ;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0235

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Systems, Man and Cybernetics, VSMC-13 n5 p882-887 Sep/Oct 83.

ABSTRACT: (U) Six formal properties of anisotropic linear two dimensional filters are noted which are relevant for modeling the mechanisms of spatial visual information extraction. These properties concern the relationship between the organizational principle of a two dimensional anisotropic spatial filter or neural receptive field (such as elongation, or concatenation of subunits, or different operators mediated by lateral inhibition in neural laminae) and the resulting general consequences for spatial frequency and orientation selectivity. These properties are demonstrated without assuming particular two dimensional filter functional forms; rather, they are shown as general principles associated with certain broad categories of two dimensional filters. Such an analysis enhances our theoretical understanding of the two dimensional receptive field organization of neurons in the visual cortex and permits the rejection of some candidate organizational principles on two dimensional spectral grounds. Keywords: Reprints; Two dimensional anisotropic visual filters; Frequency selectivity; Orientation selectivity

DESCRIPTORS: (U) *ANISOTROPY, *VISION, *OPTICAL FILTERS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

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ELONGATION, EXTRACTION, INFORMATION RETRIEVAL, NERVE
CELLS, ORGANIZATIONS, ORIENTATION(DIRECTION), REPRINTS,
SPATIAL DISTRIBUTION, TWO DIMENSIONAL, VISUAL CORTEX,
MATHEMATICAL MODELS, FREQUENCY RESPONSE

IDENTIFIERS: (U) PE61102F

AD-A166 995 20/12

AUBURN UNIV ALA DEPT OF PHYSICS

(U) Semiconductor Alloy Theory

DESCRIPTIVE NOTE Annual rept. 1 Sep 84-31 Aug 85.

SEP 85 58P

PERSONAL AUTHORS: Chen, An-Ban ;

CONTRACT NO AFOSR 84-0282

PROJECT NO 2306

TASK NO B1

MONITOR: AFOSR
TR-86-0159

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigated are many topics in the theory of semiconductors and alloys including (1) Generalized Brooks' formula and the electron mobility in SiGe Alloys, (2) bond-length distribution, lattice relaxation, bond energies and mixing enthalpies in alloys, (3) hardness and dislocation energy, (4) SiGe alloys band structures and core exciton binding energy and linewidth, (5) alloy statistics and microclustering and (6) sensitivity of deep levels to band structure and potential. The important results are outlined and the details are discussed in eight publications enclosed with the report. Electron Mobility; Lattice Relaxation; Bond Energies; Mixing Enthalpies; Hardness; Dislocation; Band structure; Core Exciton; Alloy Statistics; Microclustering; Deep levels; Silicon Germanide.

DESCRIPTORS: (U) *SILICON ALLOYS, *GERMANIUM ALLOYS, *BAND THEORY OF SOLIDS, CHEMICAL BONDS, DISLOCATIONS, ELECTRON MOBILITY, ENTHALPY, EXCITONS, MIXING, NUCLEAR BINDING ENERGY, SEMICONDUCTORS, HARDNESS, LATTICE DYNAMICS, CLUSTERING

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK55I

AD-A166 994 4/1

UTAH STATE UNIV LOGAN SPACE DYNAMICS LABS

(U) Infrared Airglow Clutter

DESCRIPTIVE NOTE: Final rept. 15 Jul 83-30 Nov 85.

JAN 86 46P

PERSONAL AUTHORS: Ulwick, J. ; Baker, K. ; Steed, A. J. ;

CONTRACT NO F49620-83-C-0122

PROJECT NO 2310

TASK NO A2

MONITOR: AFOSR
TR 86-0152

AD A166 994 CONTINUED

called summer mesospheric echoes detected at high latitudes by VHF radar.

DESCRIPTORS: (U) *AIRGLOW, *INFRARED RADIATION, *IONOSPHERIC MODELS, *IONOSPHERIC DISTURBANCES, *ATMOSPHERIC TEMPERATURE, ALASKA, ALTITUDE, ATOMIC PROPERTIES, CLUTTER, COOLING, COUPLING (INTERACTION), GROUND LEVEL, HEATING, HIGH LATITUDES, MEASUREMENT, MESOSPHERE, MODELS, OXYGEN, PARTICLES, PROBES, PROFILES, RADAR, SOUNDING ROCKETS, SUMMER, SWEDEN, VERY HIGH FREQUENCY, WINTER, RADAR REFLECTIONS, REFRACTIVE INDEX, EMISSION SPECTRA, ATMOSPHERIC PRECIPITATION, BACKSCATTERING, ELECTRON DENSITY, SCATTERING, TURBULENCE, MESOPAUSE

IDENTIFIERS: (U) PE61102F

UNCLASSIFIED REPORT

ABSTRACT: (U) A rocket and ground based measurement programs was conducted to investigate infrared airglow and atomic oxygen density as part of the international MAP/WINE campaign in northern Scandinavia. The mean OH Meinel rotational temperature was approximately 199 K during a stratospheric warming event measured by a ground-based interferometer at ESRANGE in Sweden. This temperature is approximately 30 to 40 degrees cooler than measurements taken when no stratospheric events were taking place and confirms the coupling theory that stratospheric results in mesospheric cooling. The atomic oxygen profiles measured by a rocket-borne resonance lamp technique showed a peak concentration of approximately 10 to the 11th power/cc between 90 and 100 km. The rocket results obtained between 90 and 180 km altitude show densities consistently almost an order of magnitude less than predicted by standard models. However, the rocket results are consistent with other measurements taken under similar conditions: winter nights with no particle precipitation. The 1.6 micrometer rocket-borne infrared radiometer also provided excellent altitude profiles of OH emissions. The STATE campaign examined some of the same phenomena with sounding rockets and in situ probes launched from the Poker Flat Research Range, Alaska. Specifically, the campaign was designed to help us understand the origin and character of variations in the atmospheric index of refraction which give rise to the so-

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Isotopic Substitution as a Symmetry Operation in Molecular Vibrational Spectroscopy.

JAN 84 5P

PERSONAL AUTHORS: Wulfman, C. E. ; Levine, R. D. ;

CONTRACT NO. AFOSR-81-0030, NSF-CHE80-14165

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-86-0192

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v104 n1 p9-12, 27 Jan 84.

ABSTRACT: (U) The mass dependence of the eigenvalues of anharmonic oscillators can be discussed by requiring that the potential be invariant under isotopic substitution. The generators of the required symmetry group are explicitly evaluated for the Morse potential. (Reprints) What is offered in this letter is a novel point of view, where the mass is elevated from a parameter in the hamiltonian to a dynamical variable. In this way it is possible to solve for the bound states of a given potential for any value of the mass. The results for a particular isotopic species are then obtained for the particular value of the mass. We recognize that four bound state of diatomic molecules we have provided no new results. Our considerations are however equally valid for the continuous spectrum and for polyatomics.

DESCRIPTORS: (U) *ANHARMONIC OSCILLATORS, *MOLECULAR SPECTROSCOPY, *MOLECULAR VIBRATION, *ISOTOPE EFFECT, CONTINUOUS SPECTRA, EIGENVALUES, HAMILTONIAN FUNCTIONS, ISOTOPES, MASS, MORSE POTENTIAL, OPERATION, REPRINTS, SUBSTITUTES, SYMMETRY

AD A166 993

AD-A166 992 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) The Emission Spectrum of ICI Identification and Analysis of the D Prime (2) Approaching A Prime (2) Transition.

AUG 84 7P

PERSONAL AUTHORS: Spivey, J. D. ; Ashmore, J. G. ; Tellinghuisen, Joel ;

CONTRACT NO. AFOSR-83-0110, NSF-INT83-19286

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-86-0211

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v109 n5 p456-461, 31 Aug 84.

ABSTRACT: (U) The emission spectrum of Iodine monochloride (ICI) is recorded and analyzed for the separated isotopomers Iodine 127 Chlorine 35 and Iodine 127 Chlorine 37. The strongest peak near 4300 A is due mainly to D Prime approaching A prime transition, but with a significant contribution from Beta(1) approaching prime transition. Several weaker band systems are analyzed to given information about two other bound valence states, not previously reported.

DESCRIPTORS: (U) *EMISSION SPECTRA, *CHLORIDES, *IODINE COMPOUNDS, ELECTRON TRANSITIONS, TRANSITIONS, ISOTOPES, ELECTRONIC STATES, VALENCE BANDS, REPRINTS

IDENTIFIERS: (U) Chlorine 35, Chlorine 37, Iodine 127, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A166 964 CONTINUED

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Filtering and Control for Wide Bandwidth Noise Driven Systems

DESCRIPTIVE NOTE: Interim rept.,

JAN 86 60P

PERSONAL AUTHORS Kushner, H. J.; Runggaldier, W. J.

REPORT NO. LCDS 86-8

CONTRACT NO. DAAG29-84-K-0082 N00014-83-K-0542

PROJECT NO. 2104

TASK NO. A1

MONITOR AFOSR TR 86-0258

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE Sponsored in part by grant AFOSR-81-0116

ABSTRACT (U) Much of modern stochastic control theory uses ideal white noise driven models (Ito equations). If the observed data is corrupted by noise, then the noise is usually assumed to be "white Gaussian". Typically, if the underlying models are linear, one uses a Kalman-Bucy filter to get an estimate of the state, and then bases the control on this estimate. In practice, the noises are rarely "white", and the reference signals and the systems are only approximations in some sense to a diffusion. However, the less, owing to lack of viable alternatives, one still uses the Kalman-Bucy filter, etc. Then the estimates are not optimal and, indeed, might be quite far from being optimal. Similarly for the corresponding control. Examples are given to illustrate this. The sense in which the estimates and/or control is useful need to be examined in order to justify the use of the commonly used procedure. The issue is much deeper than mere "robustness" in the usual sense, since basic questions of interpretation of the results are involved. The paper deals with these questions for the filtering

problem where the signal is a "near" Gauss-Markov process and the observation noise wide band. It is shown that the usual method is "nearly optimal" with respect to a class of alternative data processors. This alternative class is rather natural and includes the data processors which one would normally want to use.

DESCRIPTORS: (U) *DATA PROCESSING EQUIPMENT, *MARKOV PROCESSES, *NOISE, APPROXIMATION (MATHEMATICS), BROADBAND, CONTROL THEORY, EQUATIONS, FILTERS, GAUSSIAN NOISE, KALMAN FILTERING, SIGNALS, STOCHASTIC CONTROL

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 923 7/3

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Synthesis and Chemistry of Energetic
Metallotetraazadienes.

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

OCT 85 16P

PERSONAL AUTHORS: Trogler, William C. ;

CONTRACT NO. AFOSR-84-0021

PROJECT NO 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0162

UNCLASSIFIED REPORT

ABSTRACT: (U) Synthetic, reactivity, and physical studies of metal tetraazadiene complexes, vanadocene nitrene complexes, and tetrazene anions are described. A serendipitous discovery of a novel isocarbonyl complex is also discussed. Keywords: Molecular orbitals, Molecular structure, Magnetic susceptibility Molecular energy levels.

DESCRIPTORS: (U) *TETRAZENES, *SYNTHESIS(CHEMISTRY), *ORGANOMETALLIC COMPOUNDS, *DIENES, ANIONS, MOLECULAR ORBITALS, MOLECULAR STRUCTURE, PHYSICAL PROPERTIES, SYNTHESIS, COMPLEX COMPOUNDS, CARBONYL COMPOUNDS, ISOMERS, MOLECULAR ENERGY LEVELS, MAGNETIC PROPERTIES

IDENTIFIERS: (U) Tetraazadienes, Vanadocene nitrenes, PE61102F, WUAFOSR2302B2

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AD-A166 908 6/5 6/16

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Visual Plasticity as Revealed in the Two-Dimensional
Modulation Transfer Function of a Meridional Amblyope.

83 8P

PERSONAL AUTHORS: Daugman, John G. ;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0234

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Human Neurobiology, v2 p71-76
1983

ABSTRACT: (U) The mammalian visual system is known to have considerable maturational plasticity, since the characteristics of early visual experience can have lasting effects on the organization and functioning of the visual cortex. One example which reveals this property is meridional amblyopia, an abnormal dependence of visual contrast sensitivity on orientation; it is demonstrably neural in origin and is presumed to reflect the redistribution of orientation-selective mechanisms in the visual cortex in response to anisotropic visual input during development. An unusual case of this abnormality was studied with two-dimensional (2D) Fourier techniques in a meridional amblyope having no history of significant astigmatism since the age of five. Modulation transfer function and point-spread surfaces were computed for comparison with a normal subject in both the 2D spatial frequency domain and the 2D space domain, based on contrast sensitivity measurements spanning the Fourier plane by radial and angular cross sections as well as a 2D Cartesian sampling lattice. Contrary to the generalization that meridional amblyopia is only found in continuing astigmats, this case suggests the potency of transient infant astigmatism to include permanent neural anisotropy. Keywords: Visual anisotropy, Maturational plasticity, Meridional amblyopia, 2D modulation transfer

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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function, Fourier plane.

DESCRIPTORS: (U) *CONTRAST, *VISUAL CORTEX, *VISUAL PERCEPTION, *VISUAL DEFECTS, ABNORMALITIES, ANISOTROPY, ASTIGMATISM, FOURIER ANALYSIS, INFANTS, INPUT, MAMMALS, MEASUREMENT, MODULATION, NERVOUS SYSTEM, ORGANIZATIONS, PLANNING, PLASTIC PROPERTIES, SENSITIVITY, TRANSFER FUNCTIONS, TRANSIENTS, TWO DIMENSIONAL, VISION, REPRINTS

IDENTIFIERS: (U) *Amblyopia, PE61102F, WUAFOSR2313A5

AD-A166 907 6/16

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Reorganization and Diversification of Signals in Vision.

FEB 85 13P

PERSONAL AUTHORS: Kronauer, Richard E.; Zeevi, Yehoshua Y.;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0246

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Systems, Man, and Cybernetics, vSMC-15 n1 p91-101 Jan-Feb 85

ABSTRACT: (U) Extensive processing and reorganization of information is required as retinally generated signals flows centrally. Insight into some principles of the reorganization and transformation that occur in the early stages of the visual pathway, prior to the higher stages of pattern recognition, is provided by analysis of receptive fields and cell counts. The rate of information flow is reduced by a retinal position-dependent (inhomogeneous) spatial sampling scheme about 100-fold. This principle of specialization, or non-uniform processing, is further elaborated in the retino-cortical mapping. In the central fovea, where the retinal spatial sampling rate is the highest and processing function is uniform, there are about 4000 striate cortical neurons receiving information from each cone. This number, which provides a measure of function multiplicity, drops to about 200 over the range of the near periphery. In the peripheral field beyond eight degrees, where information is compressed at the retina, the functional multiplicity stays approximately constant at 200. As it seems that no two cells perform exactly the same operation, it is concluded that the striate cortex performs many simultaneous functional mappings. Only a partial description of these various schemes of signal processing is deducible from present data, thus highlighting the

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challenge associated with understanding how the central nervous system constructs a meaningful representation of the visual world.

DESCRIPTORS: (U) *RETINA, *VISION, *VISUAL CORTEX, *SIGNAL PROCESSING, CENTRAL NERVOUS SYSTEM, CEREBRAL CORTEX, COMPRESSION, COUNTING METHODS, FLOW, FOVEA, INFORMATION EXCHANGE, NERVE CELLS, NONUNIFORM, PATTERN RECOGNITION, POSITION(LOCATION), PROCESSING, RATES, SAMPLING, SIGNALS, SPECIALIZATION, CELLS(BIOLOGY), MAPPING, REPRINTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2313A5

AD-A166 906 6/16 5/10

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) Opponent-Movement Mechanisms in Human Vision.

AUG 84 11P

PERSONAL AUTHORS: Stromeyer, C. F., III; Kronauer, R. E.; Madsen, J. C.; Klein, S. A.;

CONTRACT NO. F49620-81-K-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0247

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Optical Society of America A, v1 n8 p876-884 Aug 84.

ABSTRACT: (U) A vertical grating that sinusoidally reverses contrast can be synthesized from two identical component gratings that move with equal velocities in opposite directions (leftward and rightward). Such a counterphase grating is used as a suprathreshold masking pattern. When the mask is of low spatial frequency and is modulated rapidly, a test pattern consisting of an increment of the rightward component and an equivalent simultaneous decrement of the leftward component is highly detectable compared with simultaneous increments or decrements of both components. The visibility of the opponent-movement test signal is strongly facilitated by high-contrast masks. This facilitation is accompanied by a high sensitivity for judging the direction of the test. These results show that certain detection mechanisms are highly to the difference of the rightward and leftward components. However, when the mask is of threshold contrast, the rightward- and leftward moving test components appear to be detected independently. A high-contrast grating that rapidly moves in one direction strongly masks gratings moving in the same or the opposite direction; this shows that moving patterns are not detected by unidirectional mechanisms when contrast is clearly suprathreshold. The results may be explained by a model with mechanisms that are excited by one direction

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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of motion and inhibited by the other direction. Keywords:
Opponent movement, human vision.

DESCRIPTORS: (U) *GRATINGS(SPECTRA), *CONTRAST, *VISION,
*MASKING, *SPACE PERCEPTION, HUMANS, LOW FREQUENCY, MASKS,
MOTION, PATTERNS, SPATIAL DISTRIBUTION, TEST METHODS,
THRESHOLD EFFECTS, VISIBILITY, SIGNALS, PATTERN
RECOGNITION

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

AD-A166 577 13/13 11/9 20/1

ECOLE NATIONALE SUPERIEURE DES MINES DE PARIS EVRY
(FRANCE) CENTRE DES MATERIAUX

(U) The Dependence of Damage Accumulation in Carbon Fibre
Reinforced Epoxy Composites on Matrix Properties.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-29 Sep 85.

DEC 85 45P

PERSONAL AUTHORS: Bunsell, A. R. ; Ponsot, B. ;

PROJECT NO. 2301

TASK NO. D1

MONITOR: AFOSR, EOARD
84-0397, TR-86-04

UNCLASSIFIED REPORT

ABSTRACT: (U) Two types of fibre reinforced resin specimens have been tested, each having the same type of fibre but with very different resin systems. In this way the effect of matrix properties on carbon fibre reinforced resin systems has been studied. Steady loads on unidirectional specimens have confirmed that far from being the unresponsive purely elastic bodies that most measuring techniques suggest the acoustic emission technique reveals the continuous accumulation of internal damage. The acoustic emission behaviour is characterized by curves of $\ln(\dot{d}N/dN)$ as a function of total accumulated emissions which typically shows two asymptotic slopes, one at the origin, the other at infinity. An analytical expression has been proposed to describe this behaviour involving four parameters. The rate of damage accumulation has been shown to be greatly influenced by the properties of the matrix, with an increased rate observed with a resin containing a high percentage of plasticizer. The histograms of the amplitude distributions reveal a peak at 25 db at low stresses which is seen to be displaced towards 40 db at higher applied loads. It is concluded that the peak at 40 db is due to fibre failure whereas the lower peak may be due to microcracking of the matrix. The study has revealed that period of overloading are equivalent to accelerated mechanical aging at lower loads.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 577 CONTINUED

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *FIBER REINFORCEMENT, *REINFORCED PLASTICS, *AGING(MATERIALS), *ACOUSTIC EMISSIONS, ACOUSTIC PROPERTIES, ACCUMULATION, AMPLITUDE, BODIES, DAMAGE, DISTRIBUTION, EMISSION, FIBERS, INTERNAL MEASUREMENT, MECHANICAL PROPERTIES, PARAMETERS, PEAK VALUES, PLASTICIZERS, POLYMERS, RATES, STRESSES, UNIDIRECTIONAL

IDENTIFIERS: (U) PE61102F, WUAFOSR2301D1

AD-A166 571 7/4 12/1

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) On the Analysis of Transients of the Form $\exp(\lambda^2 t)$ $\operatorname{erfc}(\lambda \sqrt{t})$

84 4P

PERSONAL AUTHORS: Sridharan, R.; Levie, R. de

CONTRACT NO AFOSR-84-0017

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0126

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v170 p387-389 1984.

ABSTRACT: (U) In this reprint a simple algorithm is described for the numerical analysis of transients of the form $\exp(x^2 t) \operatorname{erfc}(x \sqrt{t})$ where x is a function of time. Such transients occur often in electrochemical measurements. (Author)

DESCRIPTORS: (U) *NUMERICAL ANALYSIS, *TRANSIENTS, ELECTROCHEMISTRY, MEASUREMENT, ALGORITHMS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD A166 466 11/6

CALIFORNIA UNIV BERKELEY DEPT OF MATERIALS SCIENCE AND
ENGINEERING

(U) Fatigue Behavior of Long and Short Cracks in Wrought
and Powder Aluminum Alloys.

DESCRIPTIVE NOTE: Research progress and forecast rept. 15
Apr 15 Nov 85.

NOV 85 4P

PERSONAL AUTHORS Ritchie, Robert D. ;

CONTRACT NO AFOSR-82-0181

PROJECT NO 2306

TASK NO A1

MONITOR AFOSR
TR 86 0088

UNCLASSIFIED REPORT

ABSTRACT (U) The fatigue behavior of short cracks,
which are small compared to the scale of the
microstructure, small compared to the scale of local
plasticity or simply physically small (i.e., approx. 1 mm)
must be considered as one of the major factors limiting
the application of defect-tolerant fatigue design for
airframe and engine components. Accordingly, the current
program is aimed at identifying factors which govern the
growth of such short cracks (in contrast to long cracks)
in a series of commercial aluminum alloys, with specific
reference to behavior at near-threshold levels (below
approx. 0.100000 mm/cycle). A summary of the research
performed during the past six months is described,
together with a review of future work.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *CRACKS, SHORT
RANGE(DISTANCE), COMMERCIAL EQUIPMENT, CONTRAST, ENGINE
COMPONENTS, FATIGUE(MECHANICS), MICROSTRUCTURE, PLASTIC
PROPERTIES, POWDER ALLOYS, SCALE, THRESHOLD EFFECTS,
WROUGHT METALS

IDENTIFIERS (U) PE61102F

AD A166 466

AD-A166 340 7/1

NATIONAL ACADEMY OF SCIENCES WASHINGTON DC

(U) Opportunities in Chemistry.

DESCRIPTIVE NOTE: Final rept.,

85 350P

PERSONAL AUTHORS: Pimentel, George C. ;

CONTRACT NO. AFOSR-83-0323

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0153

UNCLASSIFIED REPORT

Availability: National Academy Press, 2101 Constitution
Ave., N.W., Washington, DC 20418 HC \$28.50 PC \$18.50 (No
copies furnished by DTIC).

ABSTRACT: (U) In 1965, the National Research Council
Published Chemistry: Opportunities and Needs. This report
surveyed the state of the discipline at that time. In
the 20 years since then, chemistry has undergone a virtual
revolution--in its techniques, instrumentation, and
capabilities. New frontiers lie before us. These new
vistas made evident the need for a new survey of chemical
science and its intellectual and economic impact. This
report discussed the following issues: Control of
Chemical Reactions; Dealing with Molecular Complexity;
More Food; Better Health; Biotechnologies; Intellectual
Frontiers; Instrumentation; Chemistry and National Well-
Being; Better Environment; Continued Economic
Competitiveness; Increased Nation Security; Intellectual
Frontiers; Instrumentation; Manpower and Education;
Resources for Basic Research in

DESCRIPTORS: (U) *CHEMICAL ENGINEERING, NATIONAL
SECURITY, MATERIALS, ANALYTICAL CHEMISTRY, REACTION
KINETICS, CHEMISTRY, CHEMICAL REACTIONS, CONTROL, FOOD,
MOLECULES, SURVEYS, INSTRUMENTATION, CATALYSIS, ECONOMIC
IMPACT, INDUSTRIES, SECURITY, SYNTHESIS

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AD-A166 338 7/3

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303A1

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Chemical Reactions and Properties of Organosilicon Compounds Related to New Materials.

DESCRIPTIVE NOTE: Final rept. 1 feb 82-30 Sep 85,

OCT 85 23P

PERSONAL AUTHORS: West, Robert ;

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0144

UNCLASSIFIED REPORT

ABSTRACT: (U) Chemistry of compounds containing silicon-silicon double bonds was investigated. Two new disilenes were synthesized and rotational barriers to cis-trans interconversion were determined to be 25-31 Kcal/mol. Oxidation of disilenes led to the 1,3-cyclodisiloxanes, as well as to disilene epoxide and 1,2-dioxetanes, all novel structures. Many new polysilane high polymers were synthesized, and their photoactivity was investigated. Several new methods for crosslinking of polysilanes were developed, and the first polysilanes containing functional side groups were prepared. Several cyclosilane families of compounds were also investigated.

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *SILICON COMPOUNDS, CHEMICAL RADICALS, CHEMICAL BONDS, SYNTHESIS(CHEMISTRY), CYCLIC COMPOUNDS, SILOXANES, EPOXY COMPOUNDS, OXETANES, PHOTOCHEMICAL REACTIONS, CHEMICAL REACTIONS, CROSSLINKING(CHEMISTRY), POLYSILANES, POLYMERS, BARRIERS, ROTATION, SYNTHESIS, MATERIALS, CHEMISTRY, OXIDATION, SILICON, SILICON DIOXIDE

IDENTIFIERS: (U) Silenes, PEG1102F, WUAFOSR2303B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

AD-A166 290 7/4

CORNELL UNIV ITHACA NY

(U) Experimental Study of Electronic States at Metal Dielectric Interfaces.

DESCRIPTIVE NOTE: Interim technical rept 2 Feb 82 1 Feb 83.

DEC 85 9P

PERSONAL AUTHORS: Sievers, A. J.

CONTRACT NO. AFOSR-81-0121

PROJECT NO. 2306

TASK NO B2

MONITOR: AFOSR
TR-86-0076

UNCLASSIFIED REPORT

ABSTRACT: (U) Because infrared surface plasmons on metal surfaces propagate for many wavelengths, a measurement of the transport of these excitations can be used to monitor the surface itself. Using the metal edge with a broadband continuous source. Measurements of the transmission of IR surface plasmons across metal surfaces covered with a chemisorbed atomic monolayer or with thin dielectric or molecular films have been carried out and, compared with those obtained by reflection spectroscopy. Keywords: Plasmons; Broadband; Spectroscopy.

DESCRIPTORS: (U) *INFRARED SPECTROSCOPY, *INTERFACES, *PLASMONS, *DIELECTRICS, *ELECTRONIC STATES, INFRARED RADIATION, EDGES, METALS, MONOMOLECULAR FILMS, REFLECTION, THIN FILMS, BROADBAND, DIELECTRIC FILMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR682

AD-A166 290

AD A166 286 20/4

GRUMMAN AEROSPACE CORP BETHPAGE NY RESEARCH AND DEVELOPMENT CENTER

(U) An Investigation of Turbulence Mechanisms in V/STOL Upwash Flow Fields.

DESCRIPTIVE NOTE Final rept. Mar 82-Jun 85.

SEP 85 94P

PERSONAL AUTHORS: Gilbert, Barry.

REPORT NO RE 707

CONTRACT NO F49620 82-C-0025

PROJECT NO 2307

TASK NO A1

MONITOR AFOSR
TR 86 0096

UNCLASSIFIED REPORT

ABSTRACT (U) This report presents results of an experimental investigation of the abnormally high turbulent mixing layer growth rate characteristics found in the upwash regions of V/STOL flows in ground effect. The fundamental turbulent V/STOL upwash mechanisms were investigated in increasingly more complex flow configurations. Most of this study uses the two-dimensional upwash formed by the collision of opposed two-dimensional wall jets. Initial parameters used to characterize the upwash formation were identified as the maximum wall jet velocity and wall jet half velocity width. Upwash measurements were taken in flows formed from equal wall jets with the same maximum velocities and equal wall jets with the same half widths. While mixing layer growth rates were larger than those found in a free two-dimensional jet, these values were less than those previously reported. An explanation based on non-similarity conditions in the flow is offered. Abnormally high turbulence levels reported by other investigators were not found. The increased growth rate seem to be a direct effect of the head-on collision process. There is an indication that in the far field the upwash growth characteristics are approaching those found in free jets.

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which has profound implications to the turbulence modelers.

DESCRIPTORS: (U) *GROUND EFFECT, *TURBULENCE, *VERTICAL TAKEOFF AIRCRAFT, *DOWNWASH, COLLISIONS, CONFIGURATIONS, FAR FIELD, FLOW FIELDS, GROWTH(GENERAL), HEAD ON ORIENTATION, RATES, SHORT TAKEOFF AIRCRAFT, WIDTH, MIXING, JET FLOW, TWO DIMENSIONAL FLOW

IDENTIFIERS: (U) Upwash, Mixing layers, PE61102F, WUAFOSR2307A1

AD-A166 279 20/4 1/2

POSEIDON RESEARCH IRVINE CA

(U) Preliminary Research on Post-Stall Aerodynamics.

DESCRIPTIVE NOTE: Annual rept.,

SEP 85 79P

PERSONAL AUTHORS: Crow, S. C. ; Myers, R. B. ;

REPORT NO. TR-81

CONTRACT NO. F49620-84-C-0084

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-0073

UNCLASSIFIED REPORT

ABSTRACT: (U) Fundamental results for two and three dimensional unsteady flows are derived. A model for vortex shedding at salient edges is advanced. A two dimensional Euler solver that implements this vortex shedding mechanism is described. Results of applying this model to impulsively started flat plates with fixed and with oscillating chord at angle of attack are presented. Implications for manipulation of the vortex wake in a post stall maneuver are discussed. Extension of the numerical methodology to three dimensions is also discussed. Keywords: Post-stall maneuverability, Separated flow, Unsteady aerodynamics, Numerical methods and procedures.

DESCRIPTORS: (U) *STALLING, *VORTEX SHEDDING, *FLIGHT MANEUVERS, AERODYNAMIC CHARACTERISTICS, AERODYNAMICS, EULER ANGLES, FLAT PLATE MODELS, FLOW SEPARATION, MANEUVERABILITY, MANEUVERS, METHODOLOGY, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, OSCILLATION, TWO DIMENSIONAL, UNSTEADY FLOW, VORTICES, WAKE, TWO DIMENSIONAL FLOW, THREE DIMENSIONAL FLOW, ANGLE OF ATTACK

IDENTIFIERS: (U) *Unsteady aerodynamics, Post stall aerodynamics, Post stall maneuvers, PE61102F

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AD-A166 274 7/4

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

(U) Experimental Study of Electronic States at Metal-Dielectric Interfaces.

DESCRIPTIVE NOTE: Final rept. 2 Feb 81-31 May 85.

DEC 85 51P

PERSONAL AUTHORS: Sievers, A. J. ;

CONTRACT NO. AFOSR-81-0121

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR
TR-86-0080

UNCLASSIFIED REPORT

ABSTRACT: (U) Novel high resolutions electromagnetic wave techniques have been used in the optical, infrared and far infrared spectral regions to explore the electronic states at metal dielectric interfaces. Because infrared surface plasmons on metal surfaces propagate for many wavelengths, a measurement of the transmission of these surface excitations has proven to be a sensitive probe of the surface itself. Both broadband and single frequency generation techniques have been developed. Reconstructed surfaces as well as surfaces covered with a chemisorbed atomic monolayer or a thin dielectric or molecular film have been investigated with these new methods. Keywords: Electromagnetic; Electronic; Broadband.

DESCRIPTORS: (U) *DIELECTRICS, *INTERFACES, *PROBES(ELECTROMAGNETIC), *ELECTRONIC STATES, FAR INFRARED RADIATION, VISIBLE SPECTRA, INFRARED RADIATION, INFRARED SPECTRA, MEASUREMENT, METALS, DIELECTRIC FILMS, MOLECULES, PLASMONS, SENSITIVITY, SURFACES, THIN FILMS, TRANSMITTANCE, ELECTROMAGNETIC RADIATION

IDENTIFIERS: (U) PEG1102F

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AD-A166 271 20/3 20/12

MINNESOTA UNIV MINNEAPOLIS SCHOOL OF PHYSICS AND ASTRONOMY

(U) Superconductivity of Thin Film Intermetallic Compounds

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

SEP 85 53P

PERSONAL AUTHORS: Goldman, Allen M. ;

CONTRACT NO. AFOSR-84-0347

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-86-0155

UNCLASSIFIED REPORT

ABSTRACT: (U) The macroscopic as well as microscopic properties of selected thin film superconducting compounds are being investigated. The materials being studied are either members of technologically significant systems or involve possible unique mechanisms for superconductivity whose realization should extend the range of critical parameters to either higher temperatures or higher critical fields. Materials under study are the superconducting Chevrel phase compounds, selected Heavy Fermion compounds and a low carrier density superconductor, Tl doped PbTe. The latter is being investigated with an idea to understanding the superconducting field effect. Processing of the Chevrel Phase compounds is carried out in a multi source deposition system. The latter has been upgraded and improved during the grant period. The electrical and magnetic properties of the reentrant superconductor HoMo6S8 have been investigated in some detail with the magnetic and superconducting character of the low temperature phase found to be dependent on the degree of disorder in the film. Single crystal films of the Heavy fermion compound UPt3 have been prepared. Although these films are highly ordered they have not been found to be superconducting, perhaps because they are off stoichiometry by as little as one percent.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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DESCRIPTORS: (U) *INTERMETALLIC COMPOUNDS, *THIN FILMS, *SUPERCONDUCTORS, ELECTRICAL PROPERTIES, HIGH TEMPERATURE, LOW TEMPERATURE, DENSITY, DEPOSITION, THALLIUM, DOPING, MAGNETIC PROPERTIES, MULTIPLE OPERATION, PARAMETERS, SINGLE CRYSTALS, SOURCES, STOICHIOMETRY, SUPERCONDUCTIVITY, SUPERCONDUCTORS

IDENTIFIERS: (U) Chevrel phases, Lead tellurides, Fermions, Superconducting films, PE61102F

AD-A166 270 9/1 20/6

PENNSYLVANIA UNIV PHILADELPHIA CENTER FOR CHEMICAL ELECTRONICS

(U) Spin-Coated Amorphous Chalcogenide Resists Spin-Coated Amorphous Chalcogenide Glasses.

DESCRIPTIVE NOTE: Final rept. 29 Jul 81-29 Nov 84.

DEC 85 73P

PERSONAL AUTHORS: Lauks, I. ; Rabil, S. ; Santiago, J. J. ; Zemel, J. N. ;

CONTRACT NO. AFOSR-84-0320, AFOSR-81-0201

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSP
TR-86-0079

UNCLASSIFIED REPORT

ABSTRACT: (U) Amorphous films of several chalcogenides were spin-cast from solutions prepared by dissolving the starting material in organic solvents. As-deposited materials were identified as amine and amide salts. A mechanism was proposed for the dissolution of arsenic trisulfide in the organic solvent as macromolecular clusters. Thermal annealing to 200 C of arsenic trisulfide solution-cast material showed decomposition of the organic salt about 90 C followed by cross-linking of arsenic sulfide clusters above 130 C. Technologically utile, quality thin films were obtained with spin deposited arsenic trisulfides. Pattern replication using ultra violet photodoping by silver was demonstrated and a scheme for high resolution lithography was proposed. 0.4 micrometer wide patterns over 1 micrometer topography were replicated without dimensional loss. Multilayer films of up to 4.5 micrometers were obtained for optical measurements by several consecutive spinning-baking sequence, without reduction in flatness. The mean value of the index of refraction and optical band gap were 2.227 + or - 0.055 and 2.273 + or - 0.024 eV respectively. Electronic structure of As4S4 and As4Se4 molecules were calculated and the resulting molecular band gaps were consistent with the measure value for the corresponding

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glasses. The calculated density-of-valence-states for the molecules were of very good agreement with valence band XPS measurement on the solids.

DESCRIPTORS: (U) *GLASS, *THIN FILM RESISTORS, *CHALCOGENS, AMINES, DOPING, SELENIDES, X RAY PHOTOELECTRON SPECTROSCOPY, AMIDES, SALTS, CLUSTERING, MEAN, VALUE, MEASUREMENT, SOLIDS, AMORPHOUS MATERIALS, FILMS, ARSENIC SULFIDES, DECOMPOSITION, HIGH RESOLUTION, LITHOGRAPHY, ENERGY GAPS, MOLECULES, OPTICAL PROPERTIES, ORGANIC SOLVENTS, REFRACTION, ARSENIC, DEPOSITION, SPINNING(MOTION), ANNEALING, THERMAL RADIATION, LAYERS, QUALITY, THIN FILMS, SILVER, MATERIALS, STARTING, VALENCE BANDS

IDENTIFIERS: (U) PE61102F

AD-A166 257 20/5 7/4 7/5

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Laser Studies of Halogens and Oxygen

DESCRIPTIVE NOTE: Final rept 1 Nov 84-31 Oct 85,

JAN 86 6P

PERSONAL AUTHORS: Houston, Paul L. ;

CONTRACT NO. F49620-83-K-0012

PROJECT NO. 2303

TASK NO B1

MONITOR: AFOSR
TR 86 0105

UNCLASSIFIED REPORT

ABSTRACT: (U) Interconversions of energy between the metastable species of halogens, interhalogens, and oxygen are important to the determination of the mechanisms for the chemical oxygen/iodine and IF lasers and to the development of a better fundamental understanding of electronic energy transfer. Previous research by our group in this broad area has investigated the kinetics of the equilibrium $I^* + O_2 = I + O_2(\Delta)$, has measured electronic-to-vibrational energy transfer from I^* to I_2 , and has determined the rates of deactivation of I^* by alkyl and perfluoroalkyl iodides. During the past three years our efforts have focused on better ways to detect $O_2(\Delta)$, on the deactivation kinetics of I^* by Cl_2 , and on the photodissociative generation of iodine atoms. Sensitive detection of $O_2(\Delta)$ by multiphoton ionization is reported. The deactivation of I^* by Cl_2 is found to be much slower than previously thought. The photodissociation of ICN and CH₃I have been examined. The relaxation of I^* by alkyl iodides and perfluoroalkyl iodides is reported. Keywords: Electronic State Quenching; Vacuum ultraviolet.

DESCRIPTORS: (U) *IODINE, *OXYGEN, *CHEMICAL LASERS, *REACTION KINETICS, ALKYL RADICALS, ATOMS, DEACTIVATION, DETERMINATION, ELECTRON ENERGY, ELECTRONIC STATES, ENERGY TRANSFER, FLUORINE COMPOUNDS, HALOGEN COMPOUNDS, HALOGENS, IODIDES, IONIZATION, KINETICS, LASERS, METASTABLE STATE,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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PHOTODISSOCIATION, PHOTONS, QUENCHING, ULTRAVIOLET
RADIATION, VACUUM, CHEMICAL EQUILIBRIUM, CHLORINE,
RELAXATION

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F

AD-A166 246 12/1 9/2

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
RESEARCH

(U) On Finding Shortest Paths on Convex Polyhedra

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 35P

PERSONAL AUTHORS: Mount, David M. ;

REPORT NO. CAR-TR-120, CS-TR-1495

CONTRACT NO. F49620-83-C-0082

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-86-0046

UNCLASSIFIED REPORT

ABSTRACT: (U) Applications in robotics and autonomous navigation have motivated the study of motion planning and obstacle avoidance algorithms. The special case considered here is that of moving a point (the object) along the surface of a convex polyhedron (the obstacle) with n vertices. Sharir and Schorr have developed an algorithm that, given a source point on the surface of a convex polyhedron, determines the shortest path from the source to any point on the polyhedron in linear time after $O(n^3 \log n)$ preprocessing time. The preprocessed output requires $O(n^2 \log n)$ space. By using known algorithms for fast planar point location, the shortest path query time for Sharir and Schorr's algorithm is shown to be $O(k + \log n)$ where k is the number of faces traversed by the path. We give an improved preprocessing algorithm that runs in $O(n^2 \log n)$ time requiring the same query time and space. We also show how to store the output of the preprocessing algorithm in $O(n \log n)$ space while maintaining the same query time. (Author)

DESCRIPTORS: (U) *POLYGONS, *ALGORITHMS, *PREPROCESSING, AUTONOMOUS NAVIGATION, TIME, AVOIDANCE, BARRIERS, OUTPUT, TIME, ROBOTICS, POSITION(LOCATION), MOTION, PLANNING

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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INTERROGATION. PATHS

IDENTIFIERS: (U) *Polyhedrons. PE61102F

AD-A166 245 20/8 14/2

RAYTHEON CO PORTSMOUTH RI SUBMARINE SIGNAL DIV

(U) Analytical/Experimental Investigation of Corpuscular Radiation Detectors.

DESCRIPTIVE NOTE: Quarterly rept. no. 1. Jun-Aug 85.

SEP 85 59P

PERSONAL AUTHORS: Grossi, Mario D. ;

REPORT NO. 94404

CONTRACT NO. F49620-85-C-0030, DARPA Order-5271

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0074

UNCLASSIFIED REPORT

ABSTRACT: (U) Four methods potentially usable in the detection of low energy neutrinos were investigated during this project activity. The magnetic interaction approach and the metal-grain calorimeter are the approaches on which the effort mostly concentrated. However, we have also analyzed two new methods, one based on the interaction between neutrinos and superconducting electrons, and another based on a bolometric scheme that uses a silicon target. Concerning the approach based on the *neutrino/superelectron* interaction, it was decided to discontinue the study of this method because it does not hold sufficient promise to reach maturity within the strict constraints. As far as the silicon bolometer is concerned, activity is limited to an analytical effort, primarily because of lack of adequate funds. The magnetic interaction approach has still some theoretical points to be worked out. However, its mechanization is particularly simple, uses mostly off the shelf equipment, and it could be ready for a laboratory experiment at an earlier time than all the other sensors that we have under investigation. The foundation of this approach is the weak interaction between a current of low-energy neutrinos and a single unpaired electron in the target. Such an interaction implies an elastic scattering of

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neutrinos from electrons, an effect that has been observed using reactor neutrinos. The metal grain calorimeter, also known as Superheated Superconducting Colloid (SSC), is based on neutrino/nucleus scattering, that causes energy deposition by the neutrino beam on the metal grains.

DESCRIPTORS: (U) *NEUTRINOS, *CALORIMETERS, CORPUSCULAR RADIATION, DEPOSITION, DETECTION, DETECTORS, ELASTIC SCATTERING, ELECTRONS, ENERGY, BOLOMETERS, GRAIN STRUCTURES (METALLURGY), INTERACTIONS, LABORATORY TESTS, LOW ENERGY, LOW STRENGTH, MAGNETIC FIELDS, MECHANIZATION, OFF THE SHELF EQUIPMENT, SILICON, SUPERCONDUCTORS, TARGETS

IDENTIFIERS: (U) *Neutrino detectors, Low energy neutrinos, Weak interaction forces, SSC (Superheated Superconducting Colloid), Metal grain calorimeters, PEG1102F, WUAFOSR2301A4

AD-A166 244 11/4 11/10 11/2

FOSTER-MILLER INC WALTHAM MA

(U) Microcomposite Processing and Applications.

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

MAR 86 48P

PERSONAL AUTHORS: Kovar, Robert F.; Lusignea, Richard W.

REPORT NO. AFB0097-FM-8535-41

CONTRACT NO. F49620-85-C-0097

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-86-0150

UNCLASSIFIED REPORT

ABSTRACT: (U) Sol-gel reagents were successfully infiltrated into microfibrillar regions of water-swollen PBT films at loadings which exceeded 50 percent by weight. PBT/sol-gel glass microcomposite films containing rigid silica glass and silicone elastomer were prepared by reaction with tetramethoxysilane and dimethyldimethoxysilane, respectively. The amount of sol-gel glass introduced into PBT film was controlled by variation of sol-gel reagent concentration. Densification of PBT/sol-gel glass microcomposite films at moderate temperatures and pressures decreased film thickness and increased stiffness. Optical and scanning electron microscopy indicated that sol-gel reagents had uniformly infiltrated microfibrillar regions of PBT, forming interpenetrating networks. Pyrolysis of PBT/sol-gel glass samples in air produced continuous, wispy, translucent films of silica residue, providing evidence of previous sol-gel glass morphology within PBT film interiors. Dense, well-consolidated laminates were prepared using PBT/sol-gel glass microcomposite films, and sol-gel reagents or adhesives as binder resins. These results provided methods for fabricating useful structures with improved stiffness, impact-resistance and interlaminar adhesion. Phase I of this program demonstrated the feasibility of significantly improving PBT film properties by

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infiltration with sol-gel glass reagents. Phase II will analyze PBT/sol-gel glass morphology, develop sol-gel reagent infiltration processes, lamination and coating of PBT films and fabrication of test samples.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *POLYMERIC FILMS, *SILICA GLASS, ADHESIVES, BINDERS, COATINGS, ELASTOMERS, ELECTRON MICROSCOPY, ELECTRONIC SCANNERS, FABRICATION, FILMS, LAMINATES, OPTICAL ANALYSIS, POLYMERS, PYROLYSIS, RIGIDITY, SAMPLING, SILICON DIOXIDE, SILICONES, STIFFNESS, THICKNESS, COMPOSITE STRUCTURES

IDENTIFIERS: (U) *Polybenzothiazole, PE61102F, WUAFO, SR3005A1

AD-A166 243 11/4 11/10 20/11 14/2

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) Novel Macromolecular Structures and Composites.

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

JUN 85 12P

PERSONAL AUTHORS: Karasz, Frank E. ;

CONTRACT NO. AFOSR-83-0341

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0143

UNCLASSIFIED REPORT

ABSTRACT: (U) The Dynastat mechanical testing instrument purchased under the URIP Grant is now fully operational. It is presently being used to a large extent for research involving the Farris research group. The projects primarily influenced and which constitute about 90% of the time on the instrument are the AFML Molecular Composites Program and a DoD LOVA program. The instrument is sufficiently versatile that it can be used for a multitude of materials and is especially useful for very stiff materials, a region where most instruments fail. As an example of the type of data that can be taken we have included some recent data. Figure 1 illustrates the in-phase modulus in uniaxial compression of a polyacetal-polyurethane thermoplastic elastomer as a function of frequency at several temperatures. Figure 2 shows the master curve for this material using the computerized time-temperature/frequency-temperature shifted data. Also included in this figure are the reduced data at 40% and 60% filler content. Figure 3 shows the curing of a graphite-epoxy prepreg in shear during cure. In this experiment the sample is being increased in temperature linearly with time. The prepreg softens at about 50 C and little happens until 160 C where reaction commences, as illustrated by a drop in the loss factor and an increase in the stiffness. It is currently being used to develop a new Impulse Method of Viscoelastic characterization which

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related time-integrals of stress to time integrals of strain for pulse experiments.

DESCRIPTORS: (U) *MACROMOLECULES, *COMPOSITE MATERIALS, *ELASTOMERS, COMPRESSION, FREQUENCY, GRAPHS, INTEGRALS, LOSSES, MATERIALS, MECHANICAL PROPERTIES, MOLECULES, PULSES, STIFFNESS, STRUCTURES, TEST METHODS, TIME, GUN PROPELLANTS, TEST EQUIPMENT, MODULUS OF ELASTICITY, ACETAL RESINS, POLYURETHANE RESINS, EPOXY COMPOSITES, GRAPHITED MATERIALS, SHEAR PROPERTIES, CURING

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

AD-A166 242 7/4

CORNELL UNIV ITHACA NY

(U) Experimental Study of Electronic States at Metal-Dielectric Interfaces.

DESCRIPTIVE NOTE: Interim technical rept. 2 Feb 81-1 Feb 82,

DEC 85 21P

PERSONAL AUTHORS: Sievers, A. J. ;

CONTRACT NO. AFOSR-81-0121

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR
TR-86-0077

UNCLASSIFIED REPORT

ABSTRACT: (U) By means of new infrared techniques we are exploring both the time and frequency domain spectra of electronic interface states. These data can be used to obtain information specific to interfaces such as mobility and diffusion, lifetimes, energy levels and the density of states. We shall continue the development of new infrared techniques which are ideally matched to the interface problem and then use these techniques to measure and characterize the physical properties of electronic states at metal-dielectric interfaces. Since these techniques rely on evanescent electromagnetic waves a closely related objective is to explore the near field electrodynamics of structures which produce evanescent fields. Metal semiconductor interfaces can be studied with broadband SEW spectroscopy using incoherent thermal radiation for a source and the surface photoconductivity for a detector. With coherent sources power dependent absorption measurements and also light scattering from surface electrokinetic phenomena become feasible. These instruments will not only be used to probe the excitation spectra of metal-semiconductor interface states but also to explore the magnetic field dependence of the energy levels in n-type InSbNiSb eutectic.

DESCRIPTORS: (U) *DIELECTRICS, *INTERFACES, *METALS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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*INFRARED SPECTROSCOPY, *SURFACE CHEMISTRY, *EUTECTICS, ELECTRONIC STATES, ENERGY LEVELS, EVANESCENT WAVES, EXCITATION, TIME DOMAIN, FREQUENCY, INCOHERENT SCATTERING, INFRARED RADIATION, ELECTRODYNAMICS, LIGHT SCATTERING, MAGNETIC FIELDS, ELECTROMAGNETIC RADIATION, SURFACE WAVES, NEAR FIELD, PHOTOCONDUCTIVITY, SEMICONDUCTORS, SPECTRA, SURFACES, THERMAL RADIATION

IDENTIFIERS: (U) *Surface electromagnetic waves, Nickel antimonides, Frequency domain, PE61102F, WUAFOSR2306B2

AD-A166 234 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Asymptotic Methods for the Analysis, Estimation, and Control of Stochastic Dynamic Systems.

DESCRIPTIVE NOTE: Annual rept. 11 Nov 84-10 Nov 85.

DEC 85 26P

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

REPORT NO. LIDS-SR-1516

CONTRACT NO. AFOSR-82-0258

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0026

UNCLASSIFIED REPORT

ABSTRACT: (U) The basic scope of this grant is to carry out fundamental research in the analysis, control, and estimation of complex systems, with particular emphasis on the use of methods of asymptotic analysis and multiple time scales to decompose complex problems into interconnections of simpler ones. During the time period covered by this report, significant progress had been made in several areas, leading to important results and to promising direction for further research. The Specific topics covered in this report are: 1) Analysis and Estimation for Finite-State and Hybrid Processes Possessing Time or Spatial Decompositions; 2) Analysis and control of Singularly Perturbed and Weakly Coupled Linear Systems; and 3) Analysis and Estimation for Singular Systems. Keywords: Linear estimation.

DESCRIPTORS: (U) *ASYMPTOTIC SERIES, SYSTEMS ANALYSIS, COUPLING(INTERACTION), LINEAR SYSTEMS, HYBRID SYSTEMS, DECOMPOSITION, TIME INTERVALS, METHODOLOGY, ESTIMATES, DYNAMICS, STOCHASTIC PROCESSES

IDENTIFIERS: (U) PE61102F

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Reactions of Laser-Generated Free Radicals at
Semiconductor Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Sep 85.

NOV 85 7P

PERSONAL AUTHORS: Steinfeld, Jeffrey I. ;

CONTRACT NO. AFOSR-83-0007

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
86-0103

UNCLASSIFIED REPORT

ABSTRACT: (U) Reactions of laser-generated free radicals at semiconductor surfaces have been investigated by photoelectron spectroscopy of adsorbed surface layers and by laser induced fluorescence detection of the gas-phase species. Systems investigated include dissociative chemisorption of XeF₂ and CF₃ on Si(111), IR multiple photon dissociation of alkylsilanes and characterization of SiH₂. Theoretical calculations of spectroscopic, structural, and thermodynamic properties of reactive free radical intermediates have also been undertaken. Keywords: Surface Chemistry; Semiconductors; Fluorocarbons; Silicon; Cyclosilane; Laser induced fluorescence; Multiple photon excitation; Chemisorption; Laser photochemistry; and Carbon trifluoride.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *FREE RADICALS, *SURFACE CHEMISTRY, *SPECTROSCOPY, ADSORPTION, CARBON, CHEMISORPTION, COMPUTATIONS, DETECTION, FLUORIDES, FLUORINATED HYDROCARBONS, LASERS, LAYERS, PHOTOCHEMICAL REACTIONS, PHOTOELECTRON SPECTRA, REACTIVITIES, SEMICONDUCTORS, SILICON, SURFACES, THEORY, THERMODYNAMIC PROPERTIES, PHOTODISSOCIATION, SILANES

IDENTIFIERS: (U) PE61102F

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AD-A166 231 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Performance of Discrete-Time Predictors of Continuous-Time Stationary Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Aug 86.

DEC 85 52P

PERSONAL AUTHORS: Cambanis, Stamatis ; Masry, Elias ;

REPORT NO. TR-123

CONTRACT NO. F49620-85-C-0144, N00014-84-K-0042

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0013

UNCLASSIFIED REPORT

ABSTRACT: (U) This document studies the asymptotic performance of linear predictors of continuous-time stationary processes from observations at n sampling instants on a fixed observation interval. Considered are both optimal and simpler choices of predictor coefficients; uniform sampling, as well as nonuniform sampling tailored to the statistics of the process under prediction. The authors concentrate on stationary processes with rational spectral densities and obtain the asymptotic performance for cases with no and with one quadratic-mean derivative. The analytical results are supplemented by numerical examples depicting small and large sample size performance. (Author)

DESCRIPTORS: (U) *MATHEMATICAL PREDICTION, OBSERVATION, SAMPLING, STATISTICAL PROCESSES, DISCRETE DISTRIBUTION, PREDICTIONS, TIME, INTERVALS, NONUNIFORM, COEFFICIENTS, STATIONARY, LINEARITY, CONTINUITY

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A166 228 CONTINUED

TENNESSEE UNIV SPACE INST TULLAHOMA

(U) Laser Thermal Propulsion.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 83-14 Jan 84.

MAR 84 7P

PERSONAL AUTHORS: Keefer, Dennis ;

CONTRACT NO. AFOSR-83-0043

PROJECT NO. 2308

TASK NO. K1

MONITOR: AFOSR
TR-86-0086

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *CARBON DIOXIDE LASERS, *THERMAL PROPULSION SYSTEMS, *PLASMA CONTROL, ABSORPTION, ARGON, AXIAL FLOW, CAMERAS, CHAMBERS, CHANNELS, COEFFICIENTS, CONTROL, CONVECTION, CYLINDRICAL BODIES, DIGITAL COMPUTERS, DIGITAL SYSTEMS, EMISSION, ENERGY ABSORBERS, ENVIRONMENTS, FLOW, FLOW FIELDS, FRACTIONATION, FREQUENCY, GEOMETRY, IMAGE PROCESSING, IMAGES, INTERVALS, LASERS, LENGTH, OPTICAL PROPERTIES, POWER, PRESSURE, PROPULSION SYSTEMS, QUARTZ, SPATIAL DISTRIBUTION, SPECTROSCOPY, STRUCTURAL PROPERTIES, TEMPERATURE, TEST FACILITIES, THERMAL PROPERTIES, VELOCITY, VOLUME, MIXING, LENSES, INVERSION, BREMSSTRAHLUNG

IDENTIFIERS: (U) Laser propulsion, Laser sustained plasmas, Inverse bremsstrahlung, PE61102F

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this research investigation is to determine experimentally the effects of a forced convection environment and optical geometry on the stability, fractional power absorption, plasma structure, and fluid mixing in a laser sustained plasma (LSP). A continuous, 1.5 kW, axial flow, carbon dioxide laser was used to create the LSP in a cylindrical quartz flow channel. The convection flow field surrounding the plasma controlled by the volume flow through the test chamber, and the optical geometry was determined by the focal length of the lens. Digital images of the plasma in selected narrow wavelength intervals were obtained using a calibrated, CID digital camera and a VICOM digital image processing computer. These images were then Abel inverted to give a spatial plasma emission coefficient which determined the spatial distribution of the plasma temperature. Data were obtained for argon plasmas at the nominal pressure of two atmospheres and four different mean incident flow velocities from 0.4 to 2.9 m/s. The nominal incident laser power was 1 kW. Detailed examination of the complex interactions of the various energy absorption and loss mechanisms will lead to a more complete understanding of the processes which control plasma stability, fractional power absorption and mixing in the laser sustained plasma. Keywords: Laser propulsion; Laser sustained plasmas; Plasma spectroscopy; Argon plasma.

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AD-A166 224 12/1 20/4
BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS
(U) Analysis of Dynamical Systems.
DESCRIPTIVE NOTE: Rept. for 1 Sep 84-31 Aug 85.
DEC 85 8P
PERSONAL AUTHORS: Hale, Jack K. ;
CONTRACT NO. AFOSR-84-0376
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-86-0068

UNCLASSIFIED REPORT

ABSTRACT: (U) This research involves extensive studying of the problem of transverse homoclinic orbits of periodic orbits of functional differential equations (FDE's), and also systems of reaction diffusion equations and attempting to understand the effects of boundary conditions on the flow when the diffusion coefficients and the boundary conditions are varied.
DESCRIPTORS: (U) *DIFFUSION COEFFICIENT, *DIFFERENTIAL EQUATIONS, BOUNDARIES, DIFFUSION, DYNAMICS, EQUATIONS, FUNCTIONAL ANALYSIS, ORBITS, RESPONSE, PERTURBATIONS, TRANSVERSE
IDENTIFIERS: (U) Homoclinic orbits, Functional differential equations, Chaos, Reaction diffusion equations, PE61102F, WUAFOSR2304A5

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AD-A166 223 21/2 20/4
CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING
(U) Application of Rayleigh Scattering to Turbulent Flow with Heat Transfer and Combustion.
DESCRIPTIVE NOTE: Annual rept. 1 May 84-30 Apr 85.
AUG 85 7P
PERSONAL AUTHORS: Talbot, L. ;
CONTRACT NO. AFOSR-84-0124
PROJECT NO. 2308
TASK NO. A2
MONITOR: AFOSR
TR-86-0072

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of premixed turbulent V-shaped flames have been carried out using two-point Rayleigh scattering. Density fluctuation intensities, two point density covariances, and mean density profiles were found to be in good agreement with a wrinkled laminar flame model which is an extension of the Bray Moss Libby model. The probability density function for the location of the flame sheet within the turbulent flame brush was measured and found to be approximately gaussian. Mean density profiles of the turbulent flame brush were found to have a self similar behavior when scaled with the maximum slope thickness. A new optical system was developed to make time resolved Rayleigh scattering measurements along a length of a laser beam, thus extending the two point technique to a multipoint one. Keywords: Premixed turbulent flame structure; Rayleigh scattering.

DESCRIPTORS: (U) *RAYLEIGH SCATTERING, *TURBULENT FLOW, *FLAMES, *HEAT TRANSFER, LAMINAR FLOW, LASER BEAMS, MEAN, MEASUREMENT, MIXING, MODELS, OPTICAL EQUIPMENT, PROBABILITY DENSITY FUNCTIONS, PROFILES, SHEETS, STRUCTURAL PROPERTIES, TURBULENCE, DENSITY, COVARIANCE, COMBUSTION, BRUSHES, MIXING

IDENTIFIERS: (U) Premixed turbulent flames, PE61102F, WUAFOSR2308A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 222 5/10

NEW YORK UNIV MEDICAL CENTER N Y

(U) Novel Architectures for Image Processing Based on Computer Simulation and Psychophysical Studies of Human Visual Cortex.

DESCRIPTIVE NOTE: Final rept. 15 Apr 83-15 Apr 85.

JAN 86 96P

PERSONAL AUTHORS: Schwartz, Eric L. ;

CONTRACT NO. F49620-83-C-0108

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-0059

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report consists of two parts. The first part is a computer simulation of the functional architecture of visual cortex, and an examination of the possible significance that this architecture may have for understanding both human visual computation and machine vision. The second part of this report is a psychophysical investigation of human shape perception in terms of boundary descriptors of curvature. Keywords: Vision, Psychophysics, Image processing.

DESCRIPTORS: (U) *IMAGE PROCESSING, *VISUAL PERCEPTION, ARCHITECTURE, BOUNDARIES, COMPUTATIONS, COMPUTERIZED SIMULATION, HUMANS, PERCEPTION(PSYCHOLOGY), PSYCHOPHYSICS, SHAPE, VISION, VISUAL CORTEX

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

AD-A166 221 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Homogeneity and the Strong Markov Property.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Aug 86.

NOV 85 43P

PERSONAL AUTHORS: Kallenberg, Olav ;

REPORT NO. TR-130

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0014

UNCLASSIFIED REPORT

ABSTRACT: (U) The strong Markov property of a process X at a stopping time τ may be split into a conditional independence part (CI) and a homogeneity part (H). However, it turns out that (H) often implies at least some version of (CI). In the present paper, we shall assume that (H) holds on the set $\{X \text{ is a member of } B\}$, for all stopping times τ such that X is a member of F a.s., where F is a closed recurrent subset of the state space S , while B is a proper subset of F . If $F=S$, then (CI) will hold on $\{X \text{ is a member of } B\}$ for every stopping time τ , so in this case X is regenerative in B . In the general case, the same statement is conditionally true in a suitable sense, given some shift invariant delta-field. (Author)

DESCRIPTORS: (U) *MARKOV PROCESSES, HOMOGENEITY, STOPPING, TIME

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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AD-A166 220 12/1

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
RESEARCH

(U) Voronoi Diagrams on the Surface of a Polyhedron.

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 23P

PERSONAL AUTHORS: Mount, David M. ;

REPORT NO. CAR-TR-121, CS-TR-1496

CONTRACT NO. F49620-83-C-0082

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-86-0044

UNCLASSIFIED REPORT

ABSTRACT: (U) This document presents an algorithm that computes the Voronoi diagram of a set of point lying on the surface of a possibly nonconvex polyhedron. Distances are measured in the Euclidean metric along the surface of the polyhedron. The algorithm runs in $O(n^2 \log n)$ time and requires $O(n^2)$ space to store the final data structure, where n is the maximum of the number of edges and source points on the polyhedron. This algorithm generalizes or improves the running times of a number of shortest path problems both on polyhedra and in the plane amidst polygonal obstacles. By applying standard algorithms for point location, we can determine the distance from a query point to the nearest source in $O(\log n)$ time and can list the shortest path in $O(k + \log n)$ time, where k is the number of faces traversed by the path. The algorithm achieves its efficiency by a novel method of searching the polyhedron's surface. (Author)

DESCRIPTORS: (U) *POLYGONS, EDGES, ALGORITHMS, DIAGRAMS, SURFACES, PATHS, INTERROGATION, POSITION(LOCATION)

IDENTIFIERS: (U) *Polyhedrons, PE61102F, WUAFOSR2304A7

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AD-A166 219 9/2

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) The Engineering of an Environment on Small Machines.

85 12P

PERSONAL AUTHORS: Zelkowitz, Marvin V. ; Elgot, Jennifer ; Itkin, David ; Kowalchack, Bonnie ; Maggio, Michael ;

CONTRACT NO. F49620-85-K-0008

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-0018

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Computer Society, p61-69 1985.

ABSTRACT: (U) This reprint describes an environment based upon a syntax directed editor. The issues that are presented are the tradeoffs necessary to engineer this environment on small microprocessors. Some of the issues discussed include user interface, designs considerations for multiple machines and multiple target languages and performance issues on a machine like the IBM PC. The current environment is designed for Pascal, but can be used to handle related languages like C and Ada. Keywords: Symposia; Computer workstations. (Author)

DESCRIPTORS: (U) *EDITING, SYNTAX, TRADE OFF ANALYSIS, ENVIRONMENTS, MACHINES, REPRINTS, INTERFACES, USER NEEDS, MICROPROCESSORS, SYMPOSIA

IDENTIFIERS: (U) Editors, PE61102F, WUAFOSR2304A2

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TORONTO UNIV (ONTARIO) DEPT OF ELECTRICAL ENGINEERING

(U) Charge Accumulation and Arc Discharges on Spacecraft
Materials and Components.

*SPACECRAFT COMPONENTS, ELECTRIC CURRENT, ELECTRONS,
IMPACT, ION BEAMS, IONS, LOW ENERGY, DEPOSITION,
LUMINESCENCE, MATERIALS, MEASUREMENT, PEAK POWER,
RESISTORS, STRENGTH(GENERAL), SURFACES, THICKNESS,
TRAJECTORIES, TWO DIMENSIONAL

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1

NOV 85 62P

PERSONAL AUTHORS: Balmain, K. G. ;

CONTRACT NO. AFOSR-84-0342

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-86-0057

UNCLASSIFIED REPORT

ABSTRACT: (U) A study of arc discharge strength was carried out, emphasizing its variation with the thickness of the dielectric-sheet specimens which had been exposed to an incident 20 keV electron beam at a current density of a thickness at which the peak current and the energy released into a load resistor are maximized. The addition of a low-energy ion beam was found to reduce discharge strength without significantly altering thickness-scaling. Also, experimental evidence was presented for a new effect called the ion spot phenomenon in which the incident ions are focussed into a central spot which then glows due to electron-impact luminescence. The first stage in the analysis of the ion spot phenomenon has been carried out and is described in this report. A two-dimensional analysis reveals complex ion trajectories which produce not only a strip (equivalent to a spot) of ion deposition, but are also such as to produce a spot with very sharply defined edges, just as observed experimentally. As for the spacecraft-charging experimental facility, a chamber capable of holding specimens up to 30 cm diameter has been completed. Arc discharges of 700 A peak have been recorded for the largest specimens and a system for making surface potential measurements has been tested.

DESCRIPTORS: (U) *ELECTRIC ARCS, *ELECTRIC DISCHARGES,

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PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

IDENTIFIERS: (U) PE61102F

(U) Reactions of Organic Molecules on Transition Metal Surfaces

DESCRIPTIVE NOTE: Final rept. 1 Sep 82-31 Oct 85.

FEB 86 14P

PERSONAL AUTHORS: Benziger, Jay B. ;

CONTRACT NO. AFOSR-82-0302

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-86-0148

UNCLASSIFIED REPORT

ABSTRACT: (U) This project has examined reactions of organic molecules on transition metal surfaces to develop a mechanistic framework for classifying surface reactions. Electron and mass spectroscopies in conjunction with infrared spectroscopy have been used to examine reactions of organic compounds on well characterized tungsten and nickel surfaces in vacuum, as well as using voltammetry with infrared spectroscopy to study reactions on platinum electrodes. The semi-infinite nature of the metal surface provides a reagent that can act as both an electron donor and acceptor from the same Fermi level. The surface also imposes steric constraints that cause dramatic changes in adsorption with subtle changes in molecular structure. These effects have been demonstrated through spectroscopic measurements of the molecular orientation and surface reactions of benzene and pyridine and their methyl-substituted derivatives on a Ni(100) surface.

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *SURFACE REACTIONS, MASS SPECTROSCOPY, ELECTRON SPECTROSCOPY, ADSORPTION, PYRIDINES, ELECTRONS, FERMI SURFACES, SPECTROSCOPY, MOLECULES, ORIENTATION(DIRECTION), NICKEL, SURFACES, CHEMICAL AGENTS, INFRARED SPECTROSCOPY, METALS, MOLECULAR STRUCTURE, ELECTRODES, PLATINUM, MEASUREMENT, BENZENE, TRANSITION METALS, VACUUM, TUNGSTEN, VOLTAMMETRY

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MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Failure Propagation in Continuum Models of LSS (Large Space Structures). Part 1.

DESCRIPTIVE NOTE: Technical rept. 1 Sep-1 Nov 85.

NOV 85 30P

PERSONAL AUTHORS: Williams, James H. , Jr.; Lee, Samson S. ;

CONTRACT NO. F49620-85-C-0148

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR 86-0094

shown that condition (1) is absolute, meaning that the crack is always arrested. Achieving conditions (2), (3) and (4) may or may not result in crack arrest. Condition (3) is independent of either conditions (2) or (4) is a less stringent condition (that is, easier to satisfy the arrest criterion) than condition (2).

DESCRIPTORS: (U) *SPACE SYSTEMS, *STRUCTURES, *FAILURE(MECHANICS), STRUCTURAL RESPONSE, CANTILEVER BEAMS, PROPAGATION, MODELS, ARRESTING(PROCESS), CRACK PROPAGATION, CRACKS, DYNAMICS, FAILURE, CONTINUUM MECHANICS, EXITS, MATERIALS, SHEAR PROPERTIES, WAVE PROPAGATION, DISASSEMBLY, REFLECTION, DEFORMATION, TRANSVERSE

IDENTIFIERS: (U) *Large space structures, Double cantilever shear beam model, PE61102F, WUAFOSR2302B1

UNCLASSIFIED REPORT

ABSTRACT: (U) Large space structures (LSS) can often be modelled adequately as equivalent anisotropic continua. In this study concepts in failure mechanics and wave propagation are applied to analyze the dynamic failure (fracture, buckling, joint disassembly, etc.) and failure arrest behavior of such an equivalent continuum. For simplicity, the equivalent continuum is assumed to be orthotropic. Furthermore, the transverse shear deformation of the equivalent continuum is assumed to dominate. Double cantilever beam models are well established fracture mechanics models in the study of crack propagation in a continuum. An orthotropic double cantilever shear beam (DCSB) model is adopted here to study Mode I dynamic failure (which for convenience is assumed to be fracture) and arrest in continuum models of lattice structures. The orthotropic DCSB model consists of both a primary material and a finite width arrester section. The DCSB model has predicted that under the proper conditions the crack may arrest when any of the following conditions is satisfied: 1) When the initial reflected disturbance catches the crack tip, before the crack tip reaches the arrester section; 2) When the crack tip enters the arrester section; 3) When the crack tip exits the arrester section; or 4) When the initial reflected disturbance catches the crack tip, after the crack tip has exited from the arrester section. It is

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MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Wave Propagation Measurements on Two-Dimensional Lattice.

DESCRIPTIVE NOTE: Technical rept. 1 Feb-15 Sep 85.

SEP 85 32P

PERSONAL AUTHORS: Williams, James H. , Jr.; Zhang, Jia J. ;
Lee, Samson S. ;

CONTRACT NO. F49620-83-C-0092

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TP-86-0095

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investigate the effects of boundaries, lattice member connectivities, and structural defects on these parameters. Perhaps, statistical energy analysis or pattern recognition techniques would also be of benefit in such efforts.

DESCRIPTORS: (U) *IMPULSE LOADING, *SPACECRAFT, *STRUCTURAL PROPERTIES, *STRUCTURAL ANALYSIS, ATTENUATION, DEFECTS(MATERIALS), ENERGY, PATTERN RECOGNITION, POSITION(LOCATION), SIGNALS, STRESSES, TRANSDUCERS, VELOCITY, WAVE PROPAGATION, BROADBAND

IDENTIFIERS: (U) LSS(Large Space Structure), Lattices, PE61102F, WUAFOSR2307B1

UNCLASSIFIED REPORT

ABSTRACT: (U) Wave propagation characteristics of large space structures (LSS) affect their performance, integrity and the ability to nondestructively assess their integrity. In this study, wave propagation characteristics of a periodic lattice structure are determined experimentally. The structure considered is an aluminum multi-bay planar lattice. Two ultrasonic piezoceramic longitudinal transducers are mounted at various locations on the structure. Wave measurements are obtained by injecting an impulsive load via the transmitting transducer and recording the response via the receiving transducer. The waves injected into the structure are longitudinal waves, transverse to the surface, although a complex stress distribution which may be described by directivity functions is actually realized. The impulsive loading signal has a broad frequency spectrum containing frequencies greater than 0.5 MHz. This preliminary experimental study demonstrates that wave propagation characteristics of a lattice structure can be obtained. In particular, the wave speed, the frequency at the maximum amplitude of the output spectrum, and the attenuation of the maximum amplitude of the output spectrum per lattice bay traversed appear to be useful parameters in the characterization of wave propagation properties of LSS. Further study should

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AD-A166 205 5/10 6/16

NOVA TECHNICAL INC TARZANA CA

(U) An Investigation of the Use of Steady-State Evoked Potentials for Human Performance and Workload Assessment and Control.

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 83-14 Jun 85.

JUN 85 66P

PERSONAL AUTHORS: Moise, Samuel L., Jr.

CONTRACT NO. F49620-83-C 0102

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-86-0110

UNCLASSIFIED REPORT

ABSTRACT: (U) This program of research investigated Steady-State Evoked Potential (SSEP) measures to determine their utility for evaluating sensory inputs, workload, and performance variables in human operators. A primary purpose was to find techniques and measures that could be generalized to groups of subjects in operational environments. SSEP measures included power (amplitude), coherence, phase lag, and Relative Transmission Time (RTT). Included in this effort were studies of: 1. Frequency 'masking', where multiple frequencies were presented simultaneously. 2. Sensory inputs which may manipulate SSEP (e.g. color, intensity, cross-modality stimulation). 3. Correlation of SSEP measures with fatigue and task difficulty. 4. The relationship between performance in a tracking task and SSEP measures.

DESCRIPTORS: (U) *PSYCHOPHYSIOLOGY, *INFORMATION PROCESSING, OPERATORS (PERSONNEL), PERFORMANCE (HUMAN), TRACKING, WORK MEASUREMENT, WORKLOAD, DELAY, FREQUENCY, MASKING, STEADY STATE, SIMULATION, MEASUREMENT, AMPLITUDE

IDENTIFIERS: (U) SSEP (Steady State Evoked Potential), RTT (Relative Transmission Time), Evoked potential, PE61102F, WUAFOSR2313A4

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NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) The Synthesis of 1-Methyl-1-Germaadamantane

DESCRIPTIVE NOTE: Rept. for 1 Nov 84-31 Oct 85, 85 12P

PERSONAL AUTHORS: Boudjouk, Philip ; Kapfer, Craig A. ;

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0112

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v296 p339-349 1985.

ABSTRACT: (U) The Lewis acid redistribution reaction has been a useful synthetic tool in organometallic chemistry with a particularly successful record in Group IV. The reaction leads to an equilibrium mixture of all possible combinations of R and R' on the metal. Since the relative stability of the components determines the distribution of products, this route is most useful for preparing thermodynamically stable compounds. The syntheses of 1-methyl-1-germaadamantane and 1-chloro-1-germaadamantane are described. Attempts to prepare the 1-methyl-1-stannaadamantane and the novel cage systems, 1-silatri-nor- and 1-silatri-homo-adamantanes are also described as well as the syntheses of a variety of Group IV 1,3,5-trisubstituted cyclohexanes. Keywords: Lewis acid catalysis.

DESCRIPTORS: (U) *ADAMANTANES, *GERMANIUM COMPOUNDS, *SYNTHESIS (CHEMISTRY), *ORGANOMETALLIC COMPOUNDS, TIN COMPOUNDS, SILICON COMPOUNDS, CYCLOHEXANES, ACIDS, CATALYSIS, STABILITY, DISTRIBUTION, REPRINTS

IDENTIFIERS: (U) Adamantane/1-methyl-1-germa, Lewis acids, PE61102F, WUAFOSR2303B2

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NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Structure of 1,8-Bis(trimethylsilyl)naphthalene, C(16)
H(24)Si(2).

IDENTIFIERS: (U) Naphthalene/1,8-Bis(trimethylsilyl),
PE61102F, WUAFOSR2303B2

DESCRIPTIVE NOTE: Rept. for 1 Nov 84-31 Oct 85,

85 4P

PERSONAL AUTHORS: Sooriyakumaran, Ratnasabapathy ; Boudjouk,
Philip ; Garvey, Roy G. ;

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0115

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallography, vC-41
p1348-1350 1985.

ABSTRACT: (U) The molecular structure and non-hydrogen-
atom identification is found in Fig. 1. Fractional atomic
coordinates are presented in Table 2. Important
conformational and geometric parameters are presented in
Table 3. 1,8-Bis(trimethylsilyl)naphthalene displays the
effect of intramolecular strain associated with bulky
substituent groups at the peri positions. The 15.3 deg
twist of the C(1)-C(9)-C(8) and C(4)-C(10)-C(5) planes
about the C(9)-C(10) axis, the near 2 symmetry of the
molecule, and the 0.97 Å deflection of the peri (CH₃)₃Si-
groups from the mean molecular plane confirm the
resemblance to other members of the homologous series of
1,8-bis(trimethylelement)-naphthalenes. Closer
examination of the bonding parameters collected in Table
4 shows 1(b) to be more like 1(c) than 1(a). The
alignment of 1(b) in relation to the orthorhombic
crystallographic axes is shown in Fig. 2. Keywords:
Steric interactions.

DESCRIPTORS: (U) *CRYSTAL STRUCTURE, *STEREOCHEMISTRY,
*MOLECULAR STRUCTURE, *NAPHTHALENES, BONDING, PARAMETERS,
DEFLECTION, AXES, CRYSTALS, GEOMETRY, REPRINTS

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AD-A166 199 12/1
 RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
 MATHEMATICS
 (U) An Introduction to the Stabilization Problem for
 Parametrized Families of Linear Systems,
 85 34P
 PERSONAL AUTHORS: Sontag, Eduardo D. ;
 CONTRACT NO. AFOSR-85-0247, AFOSR-85-0196
 PROJECT NO. 2304
 TASK NO. A1
 MONITOR: AFOSR
 TR-86-0012

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Contemporary Mathematics, v47
 p369-400 1985.

ABSTRACT: (U) This reprint provides an introduction to
 definitions and known facts relating to the stabilization
 of parametrized families of linear systems using static
 and dynamic controllers. New results are given in the
 rational and polynomial cases. (Author)

DESCRIPTORS: (U) *PARAMETRIC INSTABILITIES, REPRINTS,
 STABILIZATION, LINEAR SYSTEMS, POLYNOMIALS, PROBLEM
 SOLVING

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F

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AD-A166 198 20/11
 LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY
 (U) Quasi-Static Experiments Designed to Explain Strength
 of Rock in an Explosion.
 DESCRIPTIVE NOTE: Final rept. 1 Feb 84-31 Jul 85.
 NOV 85 32P
 PERSONAL AUTHORS: Scholz, Christopher H. ;
 CONTRACT NO. F49620-84-C-0019, ARPA Order-4944
 PROJECT NO. 2309
 TASK NO. A1
 MONITOR: AFOSR
 TR-86-0010

UNCLASSIFIED REPORT

ABSTRACT: (U) In the failure of rock in an underground
 nuclear explosion it has often been assumed that failure
 occurs in compression which has led to difficulties in
 modeling. The Bridgman ring experiment, in which a hard
 rubber ring slipped over a steel rod was observed to
 split when subjected to a hydrostatic confining pressure,
 was repeated using pyrex glass rings. Three cases were
 studied: 1) in which both ring and rod wereunjacketed, 2)
 in which the inner wall of the ring was sealed from the
 pressure medium, and 3) in which both rod and ring were
 completely jacketed. In the first two cases, the ring was
 observed to split abruptly, with a single axial crack
 when confining pressure reached a critical level. In the
 third case no abrupt failure occurred but a number of
 axial cracks were found to have formed, grown stably, but
 did not penetrate the outer wall of the ring. The first
 two cases are explained by hydraulic fracturing of the
 ring. Observations and analysis indicate that in the
 third case the cracks initiated at flaws on the inner
 surface of the ring and propagated outwards in a stable
 manner. This case, in which a tensile crack propagates in
 an all around compressive stress field, provides some
 insight into axial cracking of rock in triaxial
 compression and tensile failure of rock under radial
 shock loading. These results are suggestive but not
 conclusive as regards the seismic coupling problem.

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DESCRIPTORS: (U) *CRACKING(FRACTURING), *CRACK PROPAGATION, *ROCK, EXPLOSION EFFECTS, STRENGTH(MECHANICS), AXES, CRACKS, FAILURE, HARDENING, RINGS, RUBBER, INTERNAL SURFACES, PRESSURE, COMPRESSIVE PROPERTIES, STRESSES, GLASS, HYDROSTATIC PRESSURE, WALLS, EXTERNAL LOADS(FORCES), COUPLING(INTERACTION), SEISMIC WAVES, RODS, STEEL, TENSILE PROPERTIES, COMPRESSION, TRIAXIAL STRESSES, SHOCK(MECHANICS), NUCLEAR EXPLOSIONS, UNDERGROUND EXPLOSIONS

IDENTIFIERS: (U) Bridgman ring experiment, WUAFOSR2309A1, PE61102F

AD-A166 197 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Large Diffusivity and Asymptotic Behavior in Parabolic Systems.

DESCRIPTIVE NOTE: Technical rept..

JAN 85 24P

PERSONAL AUTHORS: Hale, Jack K. ;

REPORT NO. LCDS-85-1

CONTRACT NO. DAAG29-83-K-0029, AFOSR-84-0376

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-86-0041

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-DMS82-05355.

ABSTRACT: (U) For systems of reaction-diffusion equations with Neumann boundary conditions, it is shown that the solutions are asymptotic to the solutions of an ordinary differential equation if the diffusivity is large. The methods apply also to reaction-diffusion systems with time delays. Keywords: Applied mathematics; Differential equations. (Author)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, APPLIED MATHEMATICS, ASYMPTOTIC SERIES, PARABOLAS, DIFFUSIVITY, DELAY, SOLUTIONS(GENERAL),

IDENTIFIERS: (U) Reaction diffusion equations, Neumann boundary conditions, PE61102F, WUAFOSR2304A9

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HAWAII UNIV HONOLULU DEPT OF PHYSICS AND ASTRONOMY

(U) Development of Low-Energy X-Ray Spectrograph System.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 83-31 May 84.

DEC 85 10P

PERSONAL AUTHORS: Henke, Burton L. ;

CONTRACT NO. AFOSR-83-0222

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-0052

DESCRIPTORS: (U) *SPECTROGRAPHS, *X RAY APPARATUS, APERTURES, BRAGG ANGLE, COMPUTER PROGRAMMING, COUPLING(INTERACTION), DATA ACQUISITION, DATA PROCESSING, EXCITATION, FILTERS, FOCUSING, GAS FLOW, LOW ENERGY, MOUNTS, OPTIMIZATION, RESOLUTION, THINNESS, TUNING, VARIABLES, ATOMIC ORBITALS, MOLECULAR ORBITALS

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1

UNCLASSIFIED REPORT

ABSTRACT: (U) The technical report describes the design and construction of a state of the art, large aperture focussing spectrograph of the Johann/Johannson geometry, specially developed for the low energy x ray region of 50-5000 eV. The spectrographic system includes (1) a four kilowatt, demountable low voltage x ray excitation source, (2) a three-position holder for samples which are closely coupled to the excitation source and with a variable take-off angle, (3) a stepping motor driven scanner which accommodates large aperture curved crystal analyzers, a 10 in. diameter focussing circle, and an automatically adjusted exit slit that provides a constant solid angle of measured radiation from the same sample area and at the same time take off angle for all Bragg angles, (4) tunable gas flow, sub-atmospheric pressure counter, and finally (5) provisions for a rapid and easy interchange of thin window filter mounts for both the x ray source and for the counter. A small computer has been specially interfaced to provides scan control, data acquisition and presentation, and preliminary data analysis. It is connected to a large computer for programmed resolution enhancement, de-convolution and the determination of absolute radiative yields from the experimental, overlapping atomic or molecular orbital spectral components.

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AD-A166 193 20/5

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Studies on Radiat e Collisional and Ultraviolet Lasers.

DESCRIPTIVE NOTE: Final technical rept. Oct 82-Sep 85,
NOV 85 24P

PERSONAL AUTHORS: Harris, S. E. ; Young, J. F. ;

CONTRACT NO. F49620-83-C-0016

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-0011

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant accomplishments of this program include: the first microwave pumping of an excimer laser; the first use of pulsed hollow cathode technology to produce substantial quantities of core excited metastable atoms; the use of these metastable atoms to delineate a partial Grotrian diagram for core excited sodium; the proposal of the concept of quasi-metastable quartet levels and the experimental verification of their importance in the column I metals; and the proposal for short wavelength systems based on super Coster Kronig transitions. Keywords: Laser technology; Extreme ultraviolet physics.

DESCRIPTORS: (U) *EXCIMERS, *ULTRAVIOLET LASERS, ATOMS, CATHODES, EXCITATION, METASTABLE STATE, MICROWAVES, PULSES, SHORT WAVELENGTHS, SODIUM, PUMPING(ELECTRONICS), ALKALI METALS, FAR ULTRAVIOLET RADIATION, RADIATIVE TRANSFER

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1

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AD-A166 190 20/9

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Recombination and Reactions in Dense Ionized Gases.

DESCRIPTIVE NOTE: Final rept. 1 Jan 80-30 Jun 84,
DEC 85 26P

PERSONAL AUTHORS: Flannery, M. R. ;

REPORT NO. GIT-85-004

CONTRACT NO. AFOSR-80-0055

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0082

UNCLASSIFIED REPORT

ABSTRACT: (U) A list of publications of the research performed during the period 1/1/80-6/30/84 is provided. Theoretical research has been conducted a) on ion-ion recombination in high pressure plasmas, b) on the theory of Rydberg collisions with electrons, ions and neutrals, and c) on the theory of ion-molecule collisions at (1 eV-5 keV)/AMU. Papers in these topics (a)-(c) have been written up and published as papers already submitted to AFOSR. In particular, a new and basic theory of ion-ion recombination in a dense gas has been developed from basic microscopic principles. The recombination rate is provided as a function of gas density and time. The theory has been published in papers already submitted to AFOSR. Appendix A of this report contains the published chapter on Theory of Ion-Molecule collisions at (1 eV-50 keV)/AMU.

DESCRIPTORS: (U) *DENSE GASES, *PLASMAS(PHYSICS), *IONIZED GASES, *RECOMBINATION REACTIONS, COLLISIONS, ELECTRONS, HIGH PRESSURE, IONS, MOLECULES, RATES, ION ION INTERACTIONS

IDENTIFIERS: (U) Rydberg state, Ion molecule interactions, PE61102F

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AD-A166 188 20/4

MONTANA STATE UNIV BOZEMAN SUPERSONIC WIND TUNNEL LAB

(U) Boundary Layer Stability Measurements over a Flat Plate at Mach 3.

DESCRIPTIVE NOTE: Final rept.,

NOV 85 203P

PERSONAL AUTHORS: Demetriades, Anthony ;

REPORT NO. SWT-TR-85-1

CONTRACT NO. AFOSR-80-0267

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-86-0056

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gain, the combined first-second modes contributing a gain of about 3, while an additional factor of 5-10 is provided by a mechanism active near the leading edge and apparently consistent with Mack's forcing-stability approach. Keywords: Boundary layer transition, Laminar boundary layer, Computer programs.

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *BOUNDARY LAYER TRANSITION, *FLAT PLATE MODELS, *LAMINAR BOUNDARY LAYER, AMPLITUDE, COMPUTER PROGRAMS, FLOW FIELDS, FREQUENCY, GAIN, LEADING EDGES, LOW FREQUENCIES, MEASUREMENT, MOMENTUM, PREDICTIONS, PROFILES, RATES, REYNOLDS NUMBER, STABILITY, SUPERSONIC WIND TUNNELS, SUPERSONIC CHARACTERISTICS

IDENTIFIERS: (U) Blasius flow, PE61102F

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Amplification of natural disturbances in a flat plate laminar boundary layer at edge Mach number 3 have been measured in a supersonic wind tunnel with and without turbulent sidewall boundary layers. Detailed flowfield measurements were made to define the self-similar region and the point where the velocity profile first departs from the Blasius theory. The first instability mode was detected with a minimum critical momentum Reynolds number of 190 and a maximum amplified frequency of 0.000225. Amplification rates for this mode agree with the available theoretical predictions, and its low-frequency, low-R region is not as distorted by monotonic amplification as previously thought. A second, very prominent and extensive instability was found which extends to much higher frequencies beyond $F = 0.00035$ and which dominates the pretransitional flow. The neutral branch location of this mode associates it with the second instability mode found in hypersonic flow and serves to clarify and present a stability diagram rational over the $M = 0.8$ range. The overall amplitude gain before the first departure is still confined to low frequencies with the first mode contributing little net

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M L ENERGIA INC PRINCETON NJ

(U) Radiative Augmented Combustion.

DESCRIPTIVE NOTE: Annual rept. no. 2, 15 Jul 84-14 Jul 85,

AUG 85 87P

PERSONAL AUTHORS: David, Moshe ;

REPORT NO. ENG-102-ATR-8508

CONTRACT NO. F49620-83-C-0133

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-0085

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DESCRIPTORS: (U) *ULTRAVIOLET RADIATION, *COMBUSTION,
*IGNITION, *PHOTODISSOCIATION, FLAME HOLDERS, FLAMES,
FLOW, INTERACTIONS, KINETICS, AUGMENTATION, LIGHT SOURCES,
MIXTURES, MOLECULES, PATHS, PHOTOCHEMICAL REACTIONS,
RADIATION, STABILITY, STATICS, CHEMICAL RADICALS, THERMAL
PROPERTIES, VACUUM ULTRAVIOLET RADIATION, REACTION
KINETICS, BURNING RATE

IDENTIFIERS (U) PE61102F, WUAFOSR2308A2

UNCLASSIFIED REPORT

ABSTRACT: (U) Radiative augmented combustion is based on the fact that radiation of selected wavelengths is capable of photodissociating stable molecules, combustion intermediates and other inhibiting species into reactive radicals. Subsequent increases in concentrations of these radicals can modify the overall kinetics and produce radiative ignition and combustion enhancements. The potential of this technique was previously demonstrated under static conditions. Recently, it has been also demonstrated under flow conditions, with advanced vacuum ultraviolet (VUV) and ultraviolet (UV) light sources. This program emphasizes research on the interaction between VUV/UV radiation and combustion under flow conditions. The main objective is to demonstrate proof of concept by radiatively igniting combustible mixtures at conditions where thermal ignition is unreliable. Additional objectives are to provide non-intrusive (optical) flameholding and to increase flame speed. Another important goal is to improve the fundamental understanding of the role of photochemical reactions within the whole kinetic scheme, and ultimately to identify the most effective photodissociative path. Consequently, the program is divided into two main subjects: ignition and enhancement.

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WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH
PA

Nb. (Author)

(U) Superconducting Electronic Film Structures.

DESCRIPTORS: (U) *SEMICONDUCTING FILMS, ANISOTROPY, BARRIERS, CARBON, DEPOSITION, EPITAXIAL GROWTH, NIOBIUM ALLOYS, ALUMINUM ALLOYS, ELECTRONIC STATES, CRITICAL TEMPERATURE, HYPOTHESES, IMPURITIES, ION BEAMS, LOW TEMPERATURE, OXIDATION, OXIDES, OXYGEN, PREPARATION, CRYSTAL GROWTH, ELECTRON DIFFRACTION, TUNNELING(ELECTRONICS), SINGLE CRYSTALS, STRUCTURAL PROPERTIES, SURFACES.

DESCRIPTIVE NOTE: Semiannual rept. 1 Jan-30 Jun 85.

AUG 85 20P

PERSONAL AUTHORS: Braginski, A. I. ; Gavalier, J. R. ;

REPORT NO. 85-9C9-SUPER-R2

CONTRACT NO. F49620-85-C-0043

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-86-0097

UNCLASSIFIED REPORT

ABSTRACT: (U) Data from Nb/Sn and Nb/Al diffusion couple experiments provided supporting evidence for a proposed hypothesis that superconducting A15 compounds are formed via an oxygen catalyzed reaction. Both epitaxy, and the addition of an impurity (carbon) were successful in increasing the critical temperatures of NbN deposited at low temperature. Critical temperatures of over 16K were obtained in epitaxially grown NbN films sputtered on substrates held at less than 100 C. RHEED and X-ray rocking curve data show that the new UHV deposition and analytical facility has the capability for epitaxially growing high quality single crystals of the technologically important A15 and B1 superconductors. Low-leakage all-NbN tunnel junctions have been developed with ion-beam oxidized Al and Mg barriers, or rf-sputtered MgO barriers. The first Nb-Sn based junctions with refractory counterelectrodes were fabricated. XPS, RHEED, and tunneling have been used to characterize: 1) the structure of epitaxial films, 2) the role of ion-beam oxidation in the preparation of tunnel barriers that can be used with refractory counterelectrodes, and 3) anisotropic surface oxide growth on single-crystal films. Nb single crystal films were prepared which have three times lower rf surface losses compared to polycrystalline

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 182 20/5 7/5 17/2

AD-A166 182 CONTINUED

TACAN AEROSPACE CORP CARLSBAD CA

HgCdTe has been successful.

(U) Nonlinear Optical Interactions in Semiconductors.

DESCRIPTORS: (U) *SEMICONDUCTOR LASERS, *OPTICAL PUMPING, *TWO PHOTON ABSORPTION, *ZINC OXIDES, *UNDERWATER COMMUNICATIONS, BLUE(COLOR), CAVITIES, COHERENCE, CRYSTAL LATTICES, DEMONSTRATIONS, ELECTRODYNAMICS, EXCITATION, EXTERNAL, FREQUENCY, GAIN, GREEN(COLOR), HEAT, INTERACTIONS, LASER CAVITIES, LAYERS, LIGHT SCATTERING, MIXING, NONLINEAR SYSTEMS, OPTICAL DETECTORS, OPTICAL MATERIALS, OPTICAL PROPERTIES, PHOTONS, PROBES, RADIATION, ROOM TEMPERATURE, SENSITIVITY, SOURCES, STIMULATION(GENERAL), SUBMARINES, TEMPERATURE SENSITIVE ELEMENTS, THIN FILMS, TRANSMITTANCE, TUNABLE LASERS, TUNING, OPTICAL COMMUNICATIONS, GALLIUM ARSENIDES, ALUMINUM GALLIUM ARSENIDE, LASER BEAMS

DESCRIPTIVE NOTE: Final rept. 10 Aug 83-31 Dec 85.

DEC 85 16P

PERSONAL AUTHORS: Salour, Michael M. ;

CONTRACT NO. F49620-83-C-0147

PROJECT NO 2306

TASK NO. C2

MONITOR: AFOSR
TR-86-0089

IDENTIFIERS: (U) Blue Green Lasers, Quantum wells, PE61102F, WUAFOSR2306C2

UNCLASSIFIED REPORT

ABSTRACT: (U) The optical pumping technique in GaAs has led to the development of a novel and highly sensitive optical temperature sensor. Completed is the experiment on two photon optical pumping in ZnO. An external cavity semiconductor laser involving ZnO as a gain medium was demonstrated under two-photon excitation. This laser should have a major impact on the development of tunable blue-green radiation for submarine communication. Completed is a paper on heat buildup in semiconductor platelets. New lasers are used to explore elementary excitation in optical thin film layers of semiconductors. This has led to the first demonstration of the feasibility of room temperature operation of a tunable coherent source involving multiple quantum well material. Completed is the construction of a simple remote (non-contact) temperature sensor to directly measure heat buildup in semiconductor materials as a result of high power optical laser excitation, as proposed in part F of our research proposal. Finally, an experiment involving optical frequency mixing to probe electrodynamics in the GaAlAs multiple quantumwell and superlattice structures, utilizing our two recently constructed tunable laser systems, has been successful. Attempts were focused on observing a number of new optical effects including nonlinear absorption and transmission phenomena, enhanced spontaneous and stimulated light scattering processes, etc. The construction of an external cavity semiconductor

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 179 12/1

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) State Estimation for Cox Processes with Unknown Law: Parametric Models.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 18P

PERSONAL AUTHORS: Karr, Alan F. ;

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0020

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Let $(N_{sub i}, M_{sub i})$ be i.i.d. copies of a Cox pair (N, M) , with the Cox processes $N_{sub i}$, but not the directing measures $M_{sub i}$, observable. Suppose that the probability law of (N, M) belongs to a finite-dimensional parametric family $\text{sub } \theta$ but is otherwise unknown. Approximations are derived for state estimators. Under standard smoothness and regularity assumptions n times the difference between the true and pseudo-state estimators converges in distribution to a Gaussian random measure, with respect to the variation norm topology. Computation of maximum likelihood estimators by the EM algorithm is discussed in general and for two specific examples. Keywords: Parametric statistical model; Maximum likelihood estimator; EM algorithm.

DESCRIPTORS: (U) *MAXIMUM LIKELIHOOD ESTIMATION, ALGORITHMS, MATHEMATICAL MODELS, PARAMETRIC ANALYSIS, PROBABILITY, TOPOLOGY, APPROXIMATION(MATHEMATICS)

IDENTIFIERS: (U) Cox processes, PE61102F

AD-A166 179

AD-A166 178 5/9 14/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program. 1985 Technical Report. Volume 3.

DESCRIPTIVE NOTE: Annual rept.,

DEC 85 1047P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86-0141

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A166 176.

ABSTRACT: (U) The United States Air Force Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. The specific objectives of the 1985 USAF-GSSSP are: To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; To further the research objectives of the United States Air Force; To enhance the research productivity. This two volume document is a compilation of the final reports written by the assigned students members about their summer research efforts.

DESCRIPTORS: (U) *STUDENTS, *ENGINEERS, *AIR FORCE RESEARCH, *RESEARCH MANAGEMENT, AIR FORCE, AIR FORCE FACILITIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, WORK, PERSONNEL MANAGEMENT

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 178 CONTINUED

IDENTIFIERS: (U) WUAFOSR230105, PE61102F

AD-A166 177 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program, 1985 Technical Report, Volume 2.

DESCRIPTIVE NOTE: Annual rept.,

DEC 85 1437P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
IR-86-0140

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A166 178.

ABSTRACT: (U) The United States Air Force Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. The specific objectives of the 1985 USAF-GSSSP are: To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; To further the research objectives of the United States Air Force; To enhance the research productivity. This two volume document is a compilation of the final reports written by the assigned students members about their summer research efforts.

DESCRIPTORS: (U) *STUDENTS, *ENGINEERS, *AIR FORCE RESEARCH, *RESEARCH MANAGEMENT, AIR FORCE, AIR FORCE FACILITIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, WORK, PERSONNEL MANAGEMENT

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

AD-A166 177 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR230105

AD-A166 176 5/9 14/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program. 1985 Technical Report. Volume 1.

DESCRIPTIVE NOTE: Annual rept..

DEC 85 1199P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86-0139

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A166 177.

ABSTRACT: (U) The United States Air Force Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate Air Force facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. The specific objectives of the 1985 USAF-GSSSP are: To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; To further the research objectives of the United States Air Force; To enhance the research productivity. This two volume document is a compilation of the final reports written by the assigned students members about their summer research efforts.

DESCRIPTORS: (U) *STUDENTS, *ENGINEERS, *AIR FORCE RESEARCH, *RESEARCH MANAGEMENT, AIR FORCE, AIR FORCE FACILITIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, WORK, PERSONNEL MANAGEMENT

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 176 CONTINUED

IDENTIFIERS: (U) WUAFOSR2301D5, PE61102F

AD-A166 175 14/2 5/9 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research
Program - Management Report - 1985.

DESCRIPTIVE NOTE: Annual rept..

DEC 85 284P

PERSONAL AUTHORS: Darrah, Rodney C. ; Espy, Susan K. ;

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR
TR-86 0138

UNCLASSIFIED REPORT

ABSTRACT: (U) The Graduate Student Summer Support Program (GSSSP) is conducted as part of the Summer Faculty Research Program as the Air Force Office of Scientific Research. The program provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the Graduate Students of universities, colleges, and technical institutions throughout the United States. The program is available to Graduate Students enrolled in either Masters Degree or Doctorate Programs. It has proven especially beneficial to the students who are starting their academic research programs. Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program. This document lists the participants and abstracts of their research completed on this project.

DESCRIPTORS: (U) 'RESEARCH MANAGEMENT', 'AIR FORCE RESEARCH', 'SCIENTISTS', 'ABSTRACTS', 'INSTRUCTORS', 'LIFE SCIENCES', 'MANAGEMENT', 'PHYSICAL SCIENCES', 'STUDENTS', 'SUMMER', 'UNITED STATES', 'UNIVERSITIES', 'PERSONNEL MANAGEMENT', 'UNIVERSITIES'

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

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AD A166 173 1174

FLORIDA UNIV GAINESVILLE DEPT OF ENGINEERING SCIENCES

IDENTIFIERS: (U) Air Force Office of Scientific Research,
GSSSP (Graduate Student Summer Support Program), Graduate
Student Summer Support Program, PEG1102F, WUAFOSR230105

(U) Improvement and Optimization of Internal Damping of
Fiber Reinforced Composite Materials.

DESCRIPTIVE NOTE: Final rept. Jun 83-Nov 85.

DEC 85 174P

PERSONAL AUTHORS: Sun, C. T. ;

CONTRACT NO AFOSR 83-0154

PROJECT NO 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0049

UNCLASSIFIED REPORT

ABSTRACT: (U) Analysis of material damping and optimization of both material damping and specific stiffness of laminated, continuous or discontinuous fiber reinforced polymer matrix is the major objective of this study. The analytical solution was achieved by using a force balanced model to derive the equivalent modulus of unidirectional aligned short fiber composites. We then apply the elastic-viscoelastic correspondence principle and separating the real and imaginary parts to obtain the storage and the loss moduli of the composite. In laminated composites we also investigate the influence of interlaminar stress on damping. To this end, we use a finite element program to evaluate the three-dimensional stress distribution in the plane of each lamina and also at each interface. We then formulate the total strain energy and apply the elastic-viscoelastic correspondence principle to obtain the analytical expression of damping of laminated composites, which is defined as the ratio of the energy dissipated per cycle and the total energy. Analytical results are compared with those obtained from classical two dimensional lamination theory. Sequential Simplex method, laminated plate theory, and an elastic-viscoelastic correspondence principle are used to optimize both material damping and a specific stiffness of composites.

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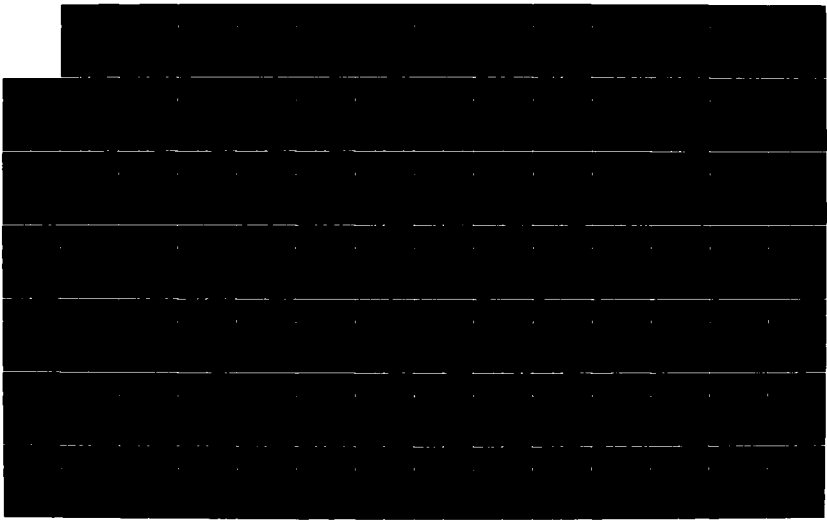
AD-A173 118

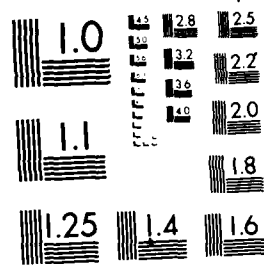
AFOSR TECHNICAL REPORT SUMMARIES APRIL-JUNE 1986(U) AIR 3/4
FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC
B WERT JUN 86 AFOSR-TR-86-0938

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MICROCOPY RESOLUTION TEST CHART
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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 173 CONTINUED

DESCRIPTORS: (U) *LAMINATES, *DAMPING, *FIBER REINFORCED COMPOSITES, ANALYTIC FUNCTIONS, COMPOSITE MATERIALS, CYCLES, ENERGY, FIBER REINFORCEMENT, FINITE ELEMENT ANALYSIS, INTERNAL LOSSES, MATERIALS, MATRIX MATERIALS, MODULUS OF ELASTICITY, OPTIMIZATION, PLATES, POLYMERS, RATIOS, SEQUENCES, SIMPLEX METHOD, SOLUTIONS(GENERAL), SPATIAL DISTRIBUTION, STIFFNESS, STORAGE, STRAIN(MECHANICS), STRESSES, THEORY, THREE DIMENSIONAL, TWO DIMENSIONAL, LAYERS

IDENTIFIERS: (U) PEB1102F

AD-A166 172 7/3 7/4

COLORADO STATE UNIV FORT COLLINS DEPT OF CHEMISTRY

(U) Selective Retention of Oxygen Using Chromatographic Columns Containing Metal Chelate Polymers.

JUL 85 8P

PERSONAL AUTHORS: Gillis, John N. ; Sievers, Robert E. ; Pollock, Glenn E. ;

CONTRACT NO. AFOSR-84-0093

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0104

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v57 n8 p1572-1577 Jul 85.

ABSTRACT: (U) Porous polymers containing various metal chelates bonded to nitrogen functionalities on the surface of the polymer have been synthesized and found to bind oxygen reversibly. The stationary phases containing 5,5'-(1,2-ethanediyldinitrilo)-bis(2,2,7-trimethyl-3-octanonato)cobalt(II) were found to be the most suitable of the phases investigated for separating oxygen from argon, nitrogen, and carbon monoxide. At ambient temperatures, near 25 C, the reversible interaction of molecular oxygen with the transition-metal complex bonded to the stationary phase results in a marked increase in the retention time of oxygen, relative to species that have similar retention times in columns that do not contain the metal chelate. The stationary phase can be used alone to achieve the separation of low molecular weight gases or in series with another column. The metal chelate stationary phase is selective for oxygen and little change in the retention time of oxygen is observed after hundreds of injections over a several-month period, indicating that no appreciable degradation of the stationary phase had taken place under these conditions.

DESCRIPTORS: (U) *CHELATE COMPOUNDS, *POLYMERS, *OXYGEN, *ORGANOMETALLIC COMPOUNDS, *CHEMICAL BONDS, DEGRADATION,

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GASES, METALS, COLUMN CHROMATOGRAPHY, CARBON MONOXIDE, ARGON, MOLECULAR PROPERTIES, MOLECULAR WEIGHT, NITROGEN, MOLECULE MOLECULE INTERACTIONS, PHASE, POROUS MATERIALS, RETENTION(GENERAL), COBALT, SEPARATION, REVERSIBLE, STATIONARY, SURFACES, TEMPERATURE, TIME, REPRINTS

IDENTIFIERS: (U) PE61102F

AD-A166 171 7/4 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Organosilane High Polymers: Thermochromic Behavior in Solution.

85 3P

PERSONAL AUTHORS: Trefonas III, Peter ; Damewood, James R. , Jr. ; West, Robert ; Miller, Robert D. ;

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0149

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in *Organometallics*, v4 p1318-1319 1985.

ABSTRACT: (U) Aliphatically substituted polydiorganosilylenes display reversible thermochromic behavior in solution with a bathochromic shift occurring with decreasing temperature. Solutions of polymers (RMeSi)n, R=n-propyl and n-hexyl, and poly(di-n-propylsilylene) show gradual bathochromic shifts of 16-25 nm from 92 to 67c. In polymers containing long di-n-alkyl substituents (n-alkyl=n-butyl, n-pentyl, and n-hexyl) the principal absorption band disappears as the temperature is lowered and a new band appears at 354 nm, giving a total red shift of up to 44nm. The temperature dependence of the UV absorption maxima is thought to be due to conformational changes occurring along the polymer backbone with temperature.

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *ABSORPTION SPECTRA, *POLYMERS, *SILANES, *THERMOCHROMIC MATERIALS, BAND SPECTRA, RED(COLOR), SHIFTING, REVERSIBLE, SOLUTIONS(GENERAL), ABSORPTION, ULTRAVIOLET RADIATION, REPRINTS

IDENTIFIERS: (U) Silylenes, Organic silicon compounds, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 170 12/1

KENT STATE UNIV OHIO

(U) Investigations on Improved Iterative Methods for Solving Sparse Systems of Linear Equations.

DESCRIPTIVE NOTE: Final rept. 1 Jul 81-30 Jun 84.

NOV 85 16P

PERSONAL AUTHORS: Varga, Richard S. ;

CONTRACT NO. AFOSR-80-0226

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0027

UNCLASSIFIED REPORT

ABSTRACT: (U) The research conducted under this effort was centered about general matrix methods and applications of matrix theory in solving large systems of linear equations. In particular, the classification of certain factorizations of M matrices was undertaken. An extension of the Stein-Rosenberg theorem comparing the spectral radii of matrices useful in constructing iterative solution techniques was obtained. The use of summability methods and approximated conformal mapping techniques in the study of iterative methods was pursued. Finally, a study of SOR and SSOR iterative methods was accomplished using the theory of H matrices. Eleven papers appeared in the referred literature during this effort. Keywords: General matrix methods; Large systems of linear equations; Stein-Rosenberg theorem.

DESCRIPTORS: (U) *ITERATIONS, SPARSE MATRIX, MATRIX THEORY, SOLUTIONS(GENERAL), CONFORMAL MAPPING, LINEAR ALGEBRAIC EQUATIONS

IDENTIFIERS: (U) PE61102F

AD A166 170

AD-A166 169 9/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Research on Nonlinear Control Theory.

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

MAR 84 5P

PERSONAL AUTHORS: Rugh, Wilson J. ;

CONTRACT NO. AFOSR-83-0079

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0043

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual report briefly describes progress on research in nonlinear control theory. Results reported include the formulation of a new approach, called design by extended linearization, for the design of nonlinear feedback (state, or output) control laws for nonlinear systems. This approach can be based on the Volterra series input output representation, or, more generally, on the state equation representation of the system to be controlled. The design yields a closed-loop system whose linearizations about constant operating points have specified eigenvalues. Publications describing the results in details are listed.

DESCRIPTORS: (U) *CONTROL THEORY, *NONLINEAR SYSTEMS, CLOSED LOOP SYSTEMS, EIGENVALUES, LINEARITY, FEEDBACK, EQUATIONS OF STATE

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 168 7/4
 TORONTO UNIV (ONTARIO) DEPT OF CHEMISTRY
 (U) Molecular Dynamics of Reactions Forming Electronically
 Excited Products.
 DESCRIPTIVE NOTE: Final rept. 15 Oct 80-14 Oct 85,
 DEC 85 6P
 PERSONAL AUTHORS: Polanyi, J. C. ;
 CONTRACT NO. AFOSR-81-0027
 PROJECT NO. 2303
 TASK NO. B1
 MONITOR: AFOSR
 TR-86-0133

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research was to
 improve understanding at a fundamental level of chemical
 processes leading to the formation of electronically
 excited products (nonadiabatic processes). The quasi-
 classical trajectory (QCT) method was used in order to
 map out various types of nonadiabatic dynamics, and to
 correlate these types of behaviour with the interaction
 potentials that give rise to them. Three dimensional
 trajectory surface hopping (TSH) was applied to pairs of
 potential energy surfaces that interacted along a seam in
 the exit valley (i.e. as products separated). This report
 summarizes the molecular dynamics of exoergic chemical
 reactions that yield products in both ground and
 electronically excited states.

DESCRIPTORS: (U) *REACTION KINETICS, *ELECTRONIC STATES,
 *MOLECULAR PROPERTIES, SURFACE REACTIONS, POTENTIAL
 ENERGY, GROUND STATE, CHEMICAL REACTIONS, EXCITATION,
 DYNAMICS, SURFACES, THREE DIMENSIONAL, TRAJECTORIES,
 EXITS, VALLEYS, YIELD

IDENTIFIERS: (U) PE61102F

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AD-A166 167 7/4 20/7
 CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
 OF CHEMICAL PHYSICS
 (U) An Intense Beam of Metastable H3 Molecules,
 JUN 84 6P
 PERSONAL AUTHORS: Garvey, James F. ; Kuppermann, Aron ;
 CONTRACT NO. AFOSR-82-0341
 PROJECT NO. 2303
 TASK NO. B1
 MONITOR: AFOSR
 TR-86-0145

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters,
 v107 n6 p491-495, 15 Jun 84.

ABSTRACT: (U) A method is described for generating a
 hyperthermal beam of metastable H3 molecules, intense
 enough for scattering and absorption spectroscopy
 experiments. From the flight time of these species
 between source and detector it is estimated that their
 lifetime exceeds 40 microsec and that they are in the 2
 A state. (Reprints)

DESCRIPTORS: (U) *MOLECULAR BEAMS, *HYDROGEN,
 *METASTABLE STATE, FLIGHT, HIGH TEMPERATURE, INTENSITY,
 REPRINTS, TIME, SCATTERING, ABSORPTION SPECTRA,
 MICROSECOND TIME

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 158 7/4

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) Electrochemical Observations of Single Molecular Events.

85 68P

PERSONAL AUTHORS: De Levie, Robert ;

CONTRACT NO. AFOSR-80-0262

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0128

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Electrochemistry and Electrochemical Engineering. v13 p1-69 1985.

ABSTRACT: (U) This review covers three areas of scientific investigation in which individual molecular events can be observed electrochemically. These areas are: electrosorption, the formation of condensed organic monolayers, and the formation of bilayer pores. After a qualitative description of some salient examples, some of the kinetics of nucleation and of growth, the problem of overlap, and the statistics involved. Keywords: Electrodeposition; Reaction kinetics.

DESCRIPTORS: (U) *MOLECULAR PROPERTIES, *ELECTROCHEMISTRY, *REACTION KINETICS, CHEMISORPTION, ORGANIC COMPOUNDS, LAYERS, POROSITY, ELECTRODEPOSITION, OBSERVATION, OVERLAP, MOLECULES, KINETICS, NUCLEATION, REPRINTS

IDENTIFIERS: (U) PE61102F

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AD-A166 157 7/4 7/3

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) Fragmentation Dynamics of Small Molecules under Nonlinear Short-Pulse UV Excitation in the Gas Phase.

DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Oct 85.

DEC 85 25P

PERSONAL AUTHORS: Weiss, Richard G. ;

CONTRACT NO. AFOSR-84-0019

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0134

UNCLASSIFIED REPORT

ABSTRACT: (U) Picosecond excitation and subnanosecond time resolution were used to distinguish prompt and delayed emission in the CN B bands from compounds XCN (X=C1, CN, CH3). The prompt component originates from unimolecular dissociation of excited valence states of C1CN and (CN)2. From a detailed kinetic analysis of the dependence of CN B emission on initial pressure, the existence of a long-lived (ca. 24-136 ns) precursor (probably vibrationally excited positive parent ions) has been postulated. Ion-molecule collisions appear essential for the delayed formation of Chr B. The collisions appear essential for the delayed formation of CN-B. The kinetic studies, in toto, have yielded a comprehensive mechanistic picture of the molecular processes subsequent to the impulse excitation and have emphasized the importance of ion-molecule collision processes. Keywords: Chemiluminescence; Acetonitrile; Cyanogen; Chlorocyanogen.

DESCRIPTORS: (U) *CHEMILUMINESCENCE, *CYANOGEN, ACETONITRILE, CATIONS, COLLISIONS, DISSOCIATION, EXCITATION, FRAGMENTATION, IONS, KINETICS, MOLECULES, PULSES, RESOLUTION, SHORT PULSES, TIME, ULTRAVIOLET RADIATION, VAPOR PHASES, EMISSION SPECTRA, BAND SPECTRA

IDENTIFIERS: (U) Nanosecond time, Picosecond time, Ion molecular interactions, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 156 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Exponential Bounds of Mean Error for the Nearest Neighbor Estimates of Regression Functions.

DESCRIPTIVE NOTE: Technical rept..

NOV 85 17P

PERSONAL AUTHORS: Zhao, L. C. ;

REPORT NO. TR-85-44

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0065

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper establishes an exponential bound of the mean deviation between $m_{sub n}(x)$ and $m(x)$ given the training sample $x_{sub n} = (x_{sub 1}, \dots, x_{sub n})$ under the conditions as weak as possible. This is a substantial improvement on Beck's results.

DESCRIPTORS: (U) *EXPONENTIAL FUNCTIONS, ESTIMATES, ERRORS, MEAN, REGRESSION ANALYSIS

IDENTIFIERS: (U) Nearest neighbor estimates. PEB1102F

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AD-A166 155 8/11 8/7

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY

(U) Measurement of Elastic Properties and Static Strength.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-1 Oct 84.

OCT 84 52P

PERSONAL AUTHORS: Johnson, Tracy L. ;

CONTRACT NO. F49620-83-C-0124, ARFA Order--4770

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-86-0055

UNCLASSIFIED REPORT

ABSTRACT: (U) Prediction of seismic coupling for nuclear monitoring requires theoretical models capable of calculating ground motions. The models must have a sound physical basis and be able to represent dynamic material behavior near the source. This portion of the study of stress wave propagation in low porosity rock is aimed at determining quasi-static properties of rock necessary to use in numerical models predicting wave propagation. Further, the failure process of low porosity rock under simulated shock loading is being studied to establish the failure mechanisms. Initial effort supported by the contract was devoted mainly to obtaining and preparing sample of Westerly granite for experiments. Preliminary experiments to characterize the properties of Westerly granite were performed on small samples obtained from the Bonner Monument Co. Material properties measured agreed well with previous determinations. Deformation of Westerly Granite was measured under standard triaxial loading conditions and under a loading path mimicking shock wave passage. Unlike high porosity rocks, the different loading paths did not substantially affect the strength of the low porosity granite. The failure envelope determined in standard triaxial tests agreed well with that measured under simulated shock loading.

DESCRIPTORS: (U) *ROCK MECHANICS, *GROUND MOTION, *GRANITE, *POROSITY, *SEISMIC WAVES, FAILURE (MECHANICS).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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MONITORING, NUCLEAR EXPLOSIONS, EARTH MODELS, DYNAMIC RESPONSE, DEFORMATION, TRIAXIAL STRESSES, LOAD DISTRIBUTION, DYNAMICS, MATERIALS, FAILURE, PATHS, ELASTIC PROPERTIES, MEASUREMENT, COUPLING(INTERACTION), PREDICTIONS, ENVELOPE(SPACE), POROSITY, ROCK, MATHEMATICAL MODELS, SHOCK WAVES, LOADS(FORCES), SIMULATION, STATICS, STRENGTH(MECHANICS), WAVE PROPAGATION, SAMPLING, STRESS WAVES, WAVE PROPAGATION, MODELS, THEORY

IDENTIFIERS: (U) *Seismic coupling, Low porosity rock, Westerly granite, PE61102F

AD-A166 154 9/3 20/14 20/3

MISSOURI UNIV-ST LOUIS DEPT OF PHYSICS

(U) Fundamental Quantum 1/f Noise in Ultrasmall Semiconductor Devices and Their Optimal Design Principles.

DESCRIPTIVE NOTE: Progress rept. no. 1, 1 May-30 Nov 85.

DEC 85 35P

PERSONAL AUTHORS: Handel, Peter H. ;

CONTRACT NO. AFOSR-85-0130

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-85-0130

UNCLASSIFIED REPORT

ABSTRACT: (U) As a first step of a more general study of 1/f noise in semiconductor devices ni+(1-p) diodes have been investigated with emphasis on HgCdTe photodetectors. Quantum 1/f noise has been calculated in the surface and bulk recombination currents, in the diffusion and field currents, and in the tunneling currents. Due to the large localized electric field at the surface, a larger fractional quantum 1/f noise power is obtained for surface recombination currents than for similar bulk recombination currents. All quantum 1/f noise calculations are first principles calculations with no free parameters, based on the quantum 1/f effect in scattering and recombination cross sections, as well as in tunneling rates. Together, the quantum 1/f mobility fluctuations, bulk and surface recombination speed fluctuations and tunneling rate fluctuations can account for the observed 1/f noise and can be used for optimizing small devices, as indicated by experiments at SBRC, Univ. of Minnesota and Florida. Some suggestions are given at the end of Sec. II. For devices larger than 10 microns coherent state quantum 1/f noise becomes important, according to a new interpolation formula. The new interpolation formula which bridges the gap between conventional (incoherent) quantum 1/f noise and coherent state quantum 1/f noise is in general agreement with

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measurements in p-n diodes and transistors, and will be tested in more detail in the near future. The theory has also been successfully applied to SQUIDS.

DESCRIPTORS: (U) *QUANTUM ELECTRONICS, *NOISE(ELECTRICAL AND ELECTROMAGNETIC), *SEMICONDUCTOR DEVICES, *PHOTODETECTORS, RADIOFREQUENCY INTERFERENCE, TUNNELING(ELECTRONICS), BULK MATERIALS, CURRENTS, RECOMBINATION REACTIONS, COMPUTATIONS, PARAMETERS, FORMULATIONS, INTERPOLATION, DIODES, N TYPE SEMICONDUCTORS, P TYPE SEMICONDUCTORS, CROSS SECTIONS, SURFACES, TRANSISTORS

IDENTIFIERS: (U) SQUID(Super Conducting Quantum Interference Devices), PE61102F, WUAF05R2305C1

AD-A166 152 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Selecting the Best Population: A Decision Theoretic Approach: The Case of Pareto Distribution.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 36P

PERSONAL AUTHORS: Dailami, N. ; Subramanyam, K. ; Rao, M. B. ;

REPORT NO. TR-85-41

CONTRACT NO. F49620-85-C-0008

PROJECT NO 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0061

UNCLASSIFIED REPORT

ABSTRACT (U) The main ideas in selecting the best populations meeting some prescribed optimality criterion have been mooted originally by Rechchofer and Gupta and the subject has gone from strength to strength by several contributions by several statisticians over the last three decades. In this paper, the selection problem is tackled from a decision theoretic point of view. In selecting the best population, we take into account the cost of sampling and the penalties for taking a wrong decision. We are basically interested in selecting the best Pareto population following the lead given by Somerville and Oforu. The Pareto proposed this model to study the distribution of incomes in various societies for comparison. In medical circles, this has been used as a model for the remission rate of discharged psychiatric patients as a survival model for cardiac patients waiting for a heart transplant operation. This paper considers four different types of penalty functions including the one considered by Oforu. Under three of these penalty function we derive the minimax sample sizes. The maximum of the resultant loss function is explicitly derived overcoming the difficulty faced by Oforu.

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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*POPULATION(MATHEMATICS), CARDIAC PATIENTS, HEART, OPERATION, TRANSPLANTATION, MEDICINE, FUNCTIONS, PENALTIES, COSTS, SAMPLING, DECISION THEORY, LOSSES, SELECTION, STATISTICAL DECISION THEORY, MODELS, SURVIVAL(GENERAL)

IDENTIFIERS: (U) Pareto distributions, PE61102F, WUAFOSR2304A5

AD-A166 151 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Tail Behavior for the Suprema of Gaussian Processes with a View Towards Empirical Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Aug 86.

NOV 85 54P

PERSONAL AUTHORS: Adler, Robert J. ; Samorodnitsky, Gennady ;

REPORT NO. TR-127

CONTRACT NO. F49620-85-C-0144, AFOSR-84-0104

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0015

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant AFOSR-85-0384.

ABSTRACT: (U) Initially this document considers the standard isonormal linear process L on a Hilbert space H , and applying metric entropy methods obtain bounds for a certain probability. Under the assumption that the entropy function of C grows polynomially, we find bounds of the form where δ^2 is the maximal variance of L . We use a notion of entropy finer than that usually employed, and specifically suited to the non-stationary situation. As a result we obtain, in the non-stationary setting, more precise bounds than any in the literature. We then treat a number of examples in which the power α is identified. These include the distribution of the maximum of certain locally stationary.

DESCRIPTORS: (U) *STATISTICAL PROCESSES, ENTROPY, LINEARITY, PROCESSING, HILBERT SPACE, METHODOLOGY, BEHAVIOR

IDENTIFIERS: (U) *Gaussian processes, PE61102F, WUAFOSR2304A5

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MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND
ENGINEERING

(U) Improved Structural Polymer Alloys and Composites.

DESCRIPTIVE NOTE: Final rept. 1 May 84-30 Apr 85.

DEC 85 18P

PERSONAL AUTHORS: Karasz, Frank E. ;

REPORT NO. UMASS-5-28246

CONTRACT NO. F49620-84-C-0051

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0132

POLYBENZIMIDAZOLE, CONTROL, REPRODUCIBILITY, STRUCTURAL
PROPERTIES, PHASE STUDIES, SYNTHESIS, COILS, MIXTURES,
DISTRIBUTION, SEQUENCES, ALLOYS, STRUCTURES, MIXING,
POLYIMIDE RESINS, COPOLYMERS, INTERACTIONS, POLYSULFONES,
SULFONATES

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

UNCLASSIFIED REPORT

ABSTRACT: (U) Substantial progress was made in both experimental and theoretical elements. First, we devised procedures to synthesize (a) sulfonated polysulfone with a controlled and reproducible structure, (b) sulfonated polyaryletheretherketone with <30% sulfonation that has potential as a new high-temperature ionomer, and (c) polyaryletherketone-co-ethersulfone made by a novel ether interchange. Blending studies centered on copolyester LCP's and polybenzimidazole/polyimide combinations. The latter are rendered compatible through specific interaction but which can be phased separated. This finding could result in greatly enhanced opportunities for the use of PBI resins. The major objectives with the LCP blends was to define criteria for miscibility and to improve their processability. Theoretical research was conducted on both LCP/LCP and random coil blends. Particularly important was work on the effect of sequence distribution on phase behavior in random coil blends. A model, containing an ordering parameter, successfully explained the special case of a random/alternating copolymer of the same composition to data.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *POLYMERS,
SOLUBILITY, POLYETHERS, KETONES, POLYESTER PLASTICS.

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AD-A166 149 8/11

CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB

(U) Body and Surface Wave Modeling of Observed Seismic Events.

DESCRIPTIVE NOTE: Final rept. 1 May-15 Dec 84.

JAN 86 40P

PERSONAL AUTHORS: Harkrider, David G. ; Helmberger, Donald V. ; Clayton, Robert W. ;

CONTRACT NO. F49620-83-C-0025, ARPA Order-4397

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-86-0053

UNCLASSIFIED REPORT

ABSTRACT: (U) In Section II, results of modeling Lg waves crossing continental margins by combining analytic with finite element calculations are presented. In Section III, a body-wave analysis of the 1966 Gisborne, New Zealand earthquake is given. In Section IV, results are presented of modeling observations of S, SS, SSS where the event occurs near tectonic margins and are recorded on stable continents. Keywords: Continent ocean transitions.

DESCRIPTORS: (U) *SEISMIC WAVES, COMPUTATIONS, EARTHQUAKES, FINITE ELEMENT ANALYSIS, MODELS, NEW ZEALAND, OBSERVATION, OCEANS, SEISMOLOGY, SURFACE WAVES, TRANSITIONS, EARTH MODELS

IDENTIFIERS: (U) Continental margins, Continent ocean transitions, Body waves (Seismic waves), PE61102F, WUAFOSR2309A1

AD-A166 148 9/4

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Stochastic Systems with Small Noise, Analysis and Simulation: A Phase Locked Loop Example.

DESCRIPTIVE NOTE: Technical rept.,

AUG 85 49P

PERSONAL AUTHORS: Dupuis, P. ; Kushner, H. ;

REPORT NO. LCDS-85-20

CONTRACT NO. AFOSR-81-0116

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0033

UNCLASSIFIED REPORT

ABSTRACT: (U) Systems with wide bandwidth noise inputs are a common occurrence in stochastic control and communication theory and elsewhere; e.g., tracking or synchronization systems such as phase locked loops (PLL). One is often interested in calculating such quantities as the probability of escape from a desired error set, in some time interval, or the mean time for such escape. Diffusion approximations (the system obtained in the limit bandwidth approaches infinity) are often used for this, being easier to analyze. We study a particular form of the PLL owing to the great practical importance of the system and because it provides a useful vehicle for understanding the extent of validity of the asymptotic methods for such systems. The basic analytical techniques are from the theory of large deviations. One seeks information on the escape probabilities, mean times, and on the most likely exit paths and exit locations. Also, we seek information on the interactions between the signals to be tracked and the noise which are most likely to lead to exit. The large deviations technique is eminently suited to this job. Simulations are taken in order to understand the range of validity of the asymptotic method. Agreement between the predictions and

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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sample estimates is good over noise intensity levels which seem to be ever larger than those typically occurring in practice.

DESCRIPTORS: (U) *INFORMATION THEORY, *LOOPS, *PHASE LOCKED SYSTEMS, *STOCHASTIC CONTROL, APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, BROADBAND, DIFFUSION, ERRORS, ESCAPE SYSTEMS, EXITS, INTENSITY, INTERACTIONS, LEVEL(QUANTITY), MEAN, METHODOLOGY, NOISE, NOISE(SOUND), PATHS, POSITION(LOCATION), PROBABILITY, SIMULATION, STOCHASTIC PROCESSES, SYNCHRONIZATION(ELECTRONICS), THEORY, TIME, TIME INTERVALS, TRACKING, VALIDATION

IDENTIFIERS: (U) PE61102F, WUAFO5R2304A1

AD-A166 147 17/2 12/1

PRINCETON UNIV NJ DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Efficient Algorithms and Structures for Robust Signal Processing.

DESCRIPTIVE NOTE: Interim rept. 30 Sep 84-27 Apr 85.

MAY 85 7P

PERSONAL AUTHORS: Dickinson, Bradley W. ;

CONTRACT NO. AFOSR-84-0381

PROJECT NO 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0040

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past 7 months, the research efforts supported by this grant have concentrated on robust estimation techniques for autoregressive models and some related system theoretic problems associated with parameter estimation problems for time series models. The motivation for this work arises from applications in signal processing such as linear predictive signal modeling, signal detection, and spectral analysis. The overall goal of this research has been put together ideas and techniques from statistics, signal processing, and system theory to bring new perspectives to such problems. Keywords include: Robust estimation techniques, and Linear predictive signal modeling

DESCRIPTORS: (U) *ESTIMATES, *SIGNAL PROCESSING, *MODELS, *SPECTRUM ANALYSIS, *SYSTEMS ANALYSIS, ALGORITHMS, DETECTION, MATHEMATICAL MODELS, MOTIVATION, PARAMETERS, SIGNALS, THEORY, TIME SERIES ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFO5R2304A5

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 145 12/1

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Informational Uniqueness of Closed-Loop Nash Equilibria for a Class of Nonstandard Dynamic Games.

AUG 85 12P

PERSONAL AUTHORS: Basar, T. ;

CONTRACT NO. N00014-82-K-0469, AFOSR-84-0054

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-0017

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Optimization Theory and Applications, v46 n4 p409-419 Aug 85.

ABSTRACT: (U) This reprint discusses an extension of the currently available theory of noncooperative dynamic games to game models whose state equations are of order higher than one. In a discrete-time framework, it first elucidates the reasons why the theory developed for first-order systems is not applicable to higher-order systems, and then presents a general procedure to obtain an informationally unique Nash equilibrium solution in the presence of random disturbances. A numerical example solved in the paper illustrates the general approach. Keywords: Second-order systems; Stochastic dynamics; Closed-loop information patterns. (Author)

DESCRIPTORS: (U) *GAME THEORY, CLOSED LOOP SYSTEMS, EQUILIBRIUM(GENERAL), SOLUTIONS(GENERAL), EQUATIONS OF STATE, MODELS, REPRINTS, STOCHASTIC PROCESSES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

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WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Disilenes and Their Derivatives.

85 9P

PERSONAL AUTHORS: West, Robert ; Fink, Mark J ; Michalczyk, Michael J ; De Young, Douglas J. ; Michl, Josef ;

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0146

UNCLASSIFIED REPORT

Availability: Document partially illegible.

SUPPLEMENTARY NOTE: Pub. in Organosilicon and Bioorganosilicon Chemistry, p3-4, 1985.

ABSTRACT: (U) It seems clear that the synthesis of geometric stereoisomers of disilenes has opened an important new area of disilene chemistry. Both the cis-trans interconversions of these isomers and their chemical reactions are beginning to provide significant insight into the nature of silicon-silicon double bonding. Disilene stereoisomers are also proving useful in the investigation of the surprising new oxidation products of the disilenes.

DESCRIPTORS: (U) *SILICON COMPOUNDS, *ISOMERS, *STEREOCHEMISTRY, CHEMICAL BONDS, CHEMICAL DERIVATIVES, CHEMICAL REACTIONS, OXIDATION, SYNTHESIS, CHEMISTRY, SILICON DIOXIDE, REPRINTS

IDENTIFIERS: (U) Disilenes, PE61102F, WUAFOSR2303B2

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HONEYWELL ELECTRO-OPTICS DIV LEXINGTON MA

IDENTIFIERS: (U) FLI(Fringe Linearization Interferometry)
Double exposure, PE61102F, WUAF05R2306A2

(U) Use of Holographic Fringe Linearization Interferometry
(FLI) for Detection of Defects.

DESCRIPTIVE NOTE: Final rept. 15 Jan 84-Aug 85.

NOV 85 92P

PERSONAL AUTHORS: Reynolds, George O. ; Servaes, Donald A. ;
Ramos, Luis ; Pierce, Daniel ; Mayville, Ronald ;

CONTRACT NO. F49620-82-C-0001

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-0108

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report shows that the two-exposure FLI holographic method is feasible. We describe how the two-exposure FLI technique can be utilized by increasing the linear fringe frequency. Reprints of the published papers from this contract describing the modeling/experiment program are appended. The feasibility of an automatic readout for the linear fringe method is demonstrated by showing that observable and measureable effects at the defect site can be monitored. The sensitivity analysis and results from a simple dynamic loading model are presented. A preliminary FLI experiment on composite samples with both static and thermal loading failed to find defects. Finally, recommendations of work necessary to develop the FLI technique are given. Keywords: Holographic interferometry; Non destructive evaluation; Lasers; Moire techniques; Finite element analyses

DESCRIPTORS: (U) *DEFECT ANALYSIS, *HOLOGRAPHY, *NONDESTRUCTIVE TESTING, LASER APPLICATIONS, MOIRE EFFECTS, DEFECTS(MATERIALS), SITES, SAMPLING, INTERFEROMETRY, LINEARITY, TEST AND EVALUATION, DYNAMIC LOADS, MODELS, DETECTION, FINITE ELEMENT ANALYSIS, REPRINTS, THERMAL PROPERTIES

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

(U) Walsh-Fourier Analysis of Discrete-Valued Time Series.

DESCRIPTIVE NOTE: Technical rept..

NOV 85 45P

PERSONAL AUTHORS: Stoffer, David S. ;

REPORT NO. TR-85-46

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0064

UNCLASSIFIED REPORT

ABSTRACT: (U) An approach to the analyses of discrete-valued time series is discussed. The analyses are accomplished in the spectral domain using the Walsh-Fourier transform which is based on Walsh functions. This approach will enable an investigator of discrete systems to analyze the data in terms of square-waveforms and sequency rather than sine-waves and frequency. This document develops a general signal-plus-noise type model for discrete-valued time series in which Walsh-Fourier spectral analysis is of interest. The author considers the problems of detecting whether or not a common signal exists in repeated measures on discrete-valued time series and in discrete-valued processes collected in an experimental design. It is shown that these models may depend on unknown regression parameters and consistent estimates of these parameters based on the finite Walsh-Fourier transform are developed. Applications to certain Markov models are given, however, the methods presented also apply to non-Markov cases. (Author)

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, *FOURIER ANALYSIS, *WALSH FUNCTIONS, DISCRETE DISTRIBUTION, SQUARE WAVES, CONSISTENCY, ESTIMATES, PARAMETERS, REGRESSION ANALYSIS, SIGNALS, MARKOV PROCESSES, MATHEMATICAL MODELS

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Selection of the Best Gamma Population.
Determination of Minimax Sample Sizes.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 27P

PERSONAL AUTHORS: Dailami, N. ; Rao, M. Bhaskara ;
Subramanyam, K. ;

REPORT NO. TR-85-42

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0066

UNCLASSIFIED REPORT

ABSTRACT: (U) Selecting the best Gamma population from a given set of Gamma populations is treated from a decision theoretic point of view. Cost of sampling and penalties for wrong decision play a role in the determination of optimum common sample sizes. Minimax sample sizes are determined under two different penalty functions. (Author)

DESCRIPTORS: (U) *MINIMAX TECHNIQUE, *DECISION THEORY, POPULATION(MATHEMATICS), STATISTICAL SAMPLES, COSTS, SAMPLING, FUNCTIONS, PENALTIES

IDENTIFIERS: (U) Gamma distribution functions, PE61102F, WUAFOSR2304A5

AD-A166 134 7/3 20/2
WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Disilathiranes. Synthesis and Crystal Structure.

85 6P

PERSONAL AUTHORS: West, Robert ; Young, Douglas J. de ;
Haller, Kenneth J. ;

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0147

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v107 n17 p4942-4946 1985.

ABSTRACT: (U) Reaction of elemental sulfur with disilene 1 or 2 produces respectively disilathirane 1,1,2,2-tetramesityl-1,2-disilathirane (3) or 1,2-di-tert-butyl-1,2-dimesityl-1,2-disilathirane (4). The crystal structure of 3 is reported; this molecule has a short Si-Si distance of 228.9 (2) pm and a nearly planar arrangement of C, C, and Si atoms around each silicon. These results are interpreted in terms of partial bonding between the silicon atoms. The molecular geometry of 3 is compared with those of other three-membered ring compounds containing two silicon atoms.

DESCRIPTORS: (U) *SILANES, *SULFUR COMPOUNDS, *CRYSTAL STRUCTURE, SILICON, SYNTHESIS, ATOMS, ORGANIC COMPOUNDS, MOLECULAR STRUCTURE, REPRINTS

IDENTIFIERS: (U) Thiranes, Silenes, PE61102F, WUAFOSR2303B2

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STANFORD UNIV CA DEPT OF CHEMISTRY

DETERMINANTS(MATHEMATICS), NUMERICAL METHODS AND
PROCEDURES, PRODUCTION, RATES, SPATIAL DISTRIBUTION,
STABILITY, STATIONARY, STRUCTURES, REPRINTS

(U) Objections to a Proposal on the Rate of Entropy
Production in Systems Far from Equilibrium.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

NOV 84 3P

PERSONAL AUTHORS: Andresen, Bjarne ; Zimmermann, E. C. ; Ross,
John ;

CONTRACT NO. F49620-84-C-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0092

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81
n10 p4676-4677, 15 Nov 84.

ABSTRACT: (U) In a recent paper Sawada postulates as a
general thermodynamic principle that an isolated system
consisting of a set of reservoirs connected through a
small nonlinear mechanism evolves spontaneously in time
in such a way that the rate of entropy production of the
whole system is at all times maximized over the allowed
paths. The rate of entropy production is a product of
fluxes and forces as calculated from deterministic
equations. In a subsequent paper Shimizu and Sawada
present a numerical calculation of spontaneously
appearing spatial structures in a one-dimensional
Brusselator and claim that, among the several possible
spatial structures, the system tends to prefer the one
producing entropy at the largest rate. In other words,
the most stable stationary state is said to be associated
with the largest S. In this article we show that this
thermodynamic postulate is not general by providing
several theoretical counter examples and an experimental
counter example. We conclude with a brief remark on the
inapplicability of the calculations in Ref. 2 to the
issue of relative stability.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *ENTROPY,
*RESERVOIRS, EQUATIONS, ISOLATION,

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) A Quantitative Study of Chemical Waves in the Belousov-Zhabotinsky Reaction.

FEB 85 14P

PERSONAL AUTHORS: Wood, Peggy Marie ; Ross, John ;

CONTRACT NO. F49620-84-C-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0101

*OXIDATION, *BROMINATION, *ORGANIC COMPOUNDS, CHEMICAL REACTIONS, CHEMICALS, CONSTANTS, DEPTH, EXCITATION, LAYERS, LINEAR ARRAYS, MIXTURES, AMPLITUDE, QUANTITATIVE ANALYSIS, IRON COMPOUNDS, IONS, PHOTODIODES, PROFILES, RESOLUTION, SOLUTIONS(GENERAL), SULFATES, SPATIAL DISTRIBUTION, SPIKES, THINNESS, WAVES, RADIATION ABSORPTION, TIME, VELOCITY, REPRINTS

IDENTIFIERS: (U) Belousov Zhabotinsky reaction, FE61102F, WUAFOSR2303B1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v82 n4 p1924-1936, 15 Feb 85.

ABSTRACT: (U) Measurements are reported of velocities, amplitudes, and profiles in space and time of chemical waves in the Belousov-Zhabotinsky reaction at various temperatures, depths of solution, and initial reactant concentrations. The measurements are made in a thin layer of a quiescent, but excitable solution by means of light absorption by ferroin, the tris(1,10-phenanthroline) ferrous sulfate complex. Propagating wave profiles are recorded on a linear photodiode array (25.6 mm length) with a spatial resolution of 50 microns. The determinations of velocity corroborate previous experimental findings. New results include experimental verification of the constancy of the concentration profile of the wave in space and time; determination of two characteristic time constants in the relaxation of the wave profile; trends in wave amplitude with variation of initial reactant concentrations and age of the reaction mixture; wave velocity as a function of temperature, and solution depth; and measurements of wave annihilation. Observations of additional structure include the onset of mosaic structure, that is the transition from a homogeneous to an inhomogeneous state due to the passage of the wave, and initiation spikes.

DESCRIPTORS: (U) *WAVE PROPAGATION, *CATALYSIS.

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Propagating and Stationary Structures in Chemical Reaction-Diffusion Systems.

JAN 85 11P

PERSONAL AUTHORS: Shyldkrot, Haim ; Ross, John ;

CONTRACT NO. F49620-84-C-0030

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-0102

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v1 n1 p113-122, 1 Jan 86.

ABSTRACT: (U) We consider propagating fronts and stationary patterns in chemical reaction-diffusion systems with nonlinear rate mechanisms maintained far from equilibrium. We study analytically and numerically the dependence on diffusion coefficients of the direction of propagation of the concentration profile which is obtained when two homogeneous steady states are placed in contact under identical constraints. We analyze the possible concentration profiles in a two-variable system with two stable stationary states for various values of diffusion coefficients and reaction time scales, and show that the direction of propagation depends on the diffusion coefficients. Finally, we show that a stationary pattern can develop behind the propagating concentration profile, a process for which there is some experimental evidence.

DESCRIPTORS: (U) *REACTION KINETICS, *CONCENTRATION(CHEMISTRY), *DIFFUSION COEFFICIENT, ORIENTATION(DIRECTION), PROFILES, NONLINEAR SYSTEMS, RATES, REACTION TIME, SCALE, HOMOGENEITY, STEADY STATE, PROPAGATION, STATIONARY, VALUE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

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TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Perfluoropolyethers via Hydrocarbon Polyesters. A New General Method.

85 7P

PERSONAL AUTHORS: Persico, Daniel F. ; Gerhardt, Glenn E. ; Lagow, Richard J. ;

CONTRACT NO. AFOSR-82-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0120

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v107 n5 p1197-1201 1985.

ABSTRACT: (U) A new general synthesis for perfluoropolyethers from hydrocarbon polyesters is described. This synthesis is a three-step scheme which involves (1) perfluorination of the hydrocarbon polyester, (2) reaction of SF₄ with the ester carbonyl to produce a CF₂ unit, and high-temperature cleavage to volatile perfluoropolyesters and oligomers. Alternatively, after treatment with nonstoichiometric amounts of SF₄, ester groups remaining in the polymer may be converted by hydrolysis to difunctional perfluoropolyether oligomers. This paper discusses specifically the conversion of the polyesters poly(2,2-dimethyl-1,3-propylene succinate) and poly(1,4-butylene adipate) to branched and linear perfluoropolyether structures, respectively.

DESCRIPTORS: (U) *POLYETHERS, *SYNTHESIS(CHEMISTRY), *FLUOROPOLYMERS, SULFUR COMPOUNDS, CARBONYL COMPOUNDS, ETHERS, ESTERS, HYDROCARBONS, POLYESTER PLASTICS, POLYMERS, SYNTHESIS, CONVERSION, HYDROLYSIS, CLEAVAGE, HIGH TEMPERATURE, POLYESTER FIBERS, PROPENES, SUCCINATES, REPRINTS

IDENTIFIERS: (U) Adipate/polybutylene, PE61102F, WUAFOSR2303B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

fluids of high thermal stability.

(U) The Synthesis of Perfluorinated Polyethers via Polyesters Deriving from the Hydrocarbons. A General Method.

85 7P

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *FLUOROPOLYMERS, *POLYETHERS, POLYPROPYLENE, ETHERS, EPOXY COMPOUNDS, FLUORINATION, THERMAL STABILITY, HYDROLYSIS, CHAINS, SYNTHETIC MATERIALS, POLYESTER FIBERS, FLUIDS, OXIDES, HYDROCARBONS, LIMITATIONS, POLYMERS, ATOMS, COPOLYMERS, TETRAFLUOROETHYLENE RESINS, POLYETHERS, CARBON, ASYMMETRY, REPRINTS

PERSONAL AUTHORS: Persico, Daniel F. ;Gerhardt, Glenn E. ; Lagow, Richard J. ;

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

CONTRACT NO. AFOSR 82-0197, AFOSR-78-3658

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0111

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Makromolekulare Chemie, Die, v6 p85-90 1985.

ABSTRACT: (U) This paper reports on a new synthetic method which we consider to be truly general. It will open synthetic routes to literally hundreds of different perfluorinated ether and polyether structures. This synthetic technique involves the direct fluorination of polyesters followed by treatment with sulfur tetrafluoride to produce new perfluorinated polyethers, and in some cases hydrolysis to produce functional perfluorinated ethers. These new methods offer a number of extremely significant and important advantages. With this technique it is possible to prepare perfluorinated polyethers containing more than two carbon atoms between two oxygen atoms in the backbone. The technology of tetrafluoroethylene oxide and hexafluoropropylene oxide (i.e. polymerization of the perfluorovinyl epoxides) is limited to polymers containing two carbon atoms between the oxygen atoms in the main chain. A second important advantage is that perfluorinated polyethers with unsymmetrical repeating units are available (AOBOAOB), whereas with perfluorovinyl epoxides other than random copolymers, one must have repeating AOA structures. The new technique is also capable of producing highly branched ethers serving as potential elastomer and

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TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Metal Vapor Synthesis of Trifluoromethyl-Group III Compounds.

84 12P

PERSONAL AUTHORS: Bierschenk, T. R. ; Juhlke, T. J. ; Bailey, W. I., Jr. ; Lagow, R. J. ;

CONTRACT NO. AFOSR-82-0197, NSF-CHE82-10708

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-86-0113

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, *SYNTHESIS(CHEMISTRY), *METHYL RADICALS, *FLUORINATED HYDROCARBONS, CONDENSATION, THALLIUM, GROUP III COMPOUNDS, ALKYLATION, GALLIUM, ISOLATION, METAL VAPORS, SYNTHESIS, CHEMICAL COMPOUNDS, CRYOGENICS, SURFACES, INDIUM, ATOMS, METALS, CHEMICAL AGENTS, FLUORINATED HYDROCARBONS, METHYL RADICALS, TRIMETHYLALUMINUM, CHEMICAL RADICALS, REPRINTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v277 p1-11 1984.

ABSTRACT: (U) Considerable effort has been directed towards synthesizing trifluoromethyl compounds of the Group III elements aluminum, gallium, indium and thallium in our laboratory. Prior to this work, the preparation of these compounds had not been successful even though trimethyl-aluminum, -gallium, -indium and -thallium derivatives have been known for many years. Our curiosity and interest in the trifluoromethyl analogues of these elements has been spurred in part by the proven usefulness of the methyl compounds. Trimethylaluminum, for instance, has many uses as a synthetic reagent; most notable being perhaps its use as an alkylating agent. A similar reagent capable of substituting trifluoromethyl groups onto metals would also be important. Tris(trifluoromethyl)thallium, $Tl(CF_3)_3$, as well as other less defined trifluoromethyl-Group III compounds have been prepared for the first time by condensing metal atoms with trifluoromethyl radicals on a cryogenic surface. The unusually reactive nature of several of the products necessitated that a very unique and elaborate metal-atom reactor be designed and constructed which would allow the isolation of the products at sub-ambient conditions.

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AD-A166 121 6/15 6/16

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) Electrochemical Response of Partially Purified Opioid Receptors.

85 5P

PERSONAL AUTHORS: Smuda, John W. ; Levie, Robert de ;

CONTRACT NO. AFOSR-84-0017

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0124

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v196 p443-446 1985.

ABSTRACT: (U) The existence of specific receptors for opium-related drugs in the vertebrate central nervous system was established by several research groups in 1973. Shortly afterwards, the endogenous agonists to which they respond were discovered, and their chemical structures elucidated. There is strong pharmacological evidence for the existence of several types of opioid receptors, with distinct pharmacological properties. Endogenous and exogenous opioid receptor agonists have been reported to modulate the synaptic release of acetylcholine, of catecholamines and of serotonin, to affect dopamine-sensitive cyclic nucleotides and adenosine triphosphatase activity as well as the transmembrane fluxes of calcium and potassium. However, it is not clear by what cellular or molecular mechanism this large variety of effects is generated. Here we report preliminary results of membrane reconstitution studies which provide direct evidence for the electrochemical nature of the action of opioid receptors. A protein fraction enriched in opioid receptors has been reconstituted in a lipid bilayer. The latter then becomes conducting in the presence of opioid agonists. This shows that the interaction of opioids with their receptor has an electrochemical component; the pharmacological evidence implicates the mu-receptor. Keywords: Neurotransmitter receptors; Opiate action;

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Bovines; Brain tissue (basal ganglia).

DESCRIPTORS: (U) *NERVES, *OPIUM ALKALOIDS, *PHARMACOLOGICAL ANTAGONISTS, *ELECTROCHEMISTRY, MEMBRANES(BIOLOGY), LIPIDS, GANGLIA, BRAIN, TISSUES(BIOLOGY), PHARMACOLOGY, POTASSIUM, SEROTONIN, BOVINES, CATECHOLAMINES, MOLECULAR STRUCTURE, RESPONSE, PROTEINS, ACETYLCHOLINE, RELEASE, CENTRAL NERVOUS SYSTEM, VERTEBRATES, SYNAPSE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

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GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

(U) Adsorption of Tetraphenylphosphonium Chloride at the
Mercury-Water Interface,

85 14P

PERSONAL AUTHORS: Saffarian, M. Hassan ; Levie, Robert de ;

CONTRACT NO AFOSR-84-0017

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0125

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical
Chemistry, v189 p325-337 1985.

ABSTRACT: (U) Specific absorption of anions at the
mercury/water interface has been studied extensively
since the pioneering work of Guoy and Grahame on halide
adsorption. Much less is known about cation specific
adsorption, partially because adsorption of the commonly
used alkali and earth alkali ions is, in general, much
weaker. However, pronounced adsorption effects are
observed with the more hydrophobic cations, such as the
quaternary ammonium and phosphonium ions. Interfacial
tension measurements of mercury in contact with aqueous
solutions of tetraphenylphosphonium chloride indicate the
existence, at negative rational potentials, of an ordered
monolayer of tetraphenylphosphonium ions, either as such
or as its neutral salt. The analysis clearly illustrates
the limits to the limits to the molecular information
obtainable from electrical measurements. Keywords: Salt
monolayers.

DESCRIPTORS: (U) *PHENYL RADICALS, *ADSORPTION,
*CHLORIDES, *PHOSPHONIUM COMPOUNDS, ANIONS, ELECTRICAL
MEASUREMENT, CATIONS, HYDROPHOBIC PROPERTIES, IONS,
INTERFACES, MERCURY, WATER, ADSORPTION,
SOLUTIONS(MIXTURES), WATER, ALKALI METAL COMPOUNDS,
INTERFACIAL TENSION, MEASUREMENT, NEUTRAL, SALTS,
ABSORPTION, LAYERS, REPRINTS

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AD-A166 119 CONTINUED

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) Simple Charging Current Correction in DC Polarography.

85 7P

PERSONAL AUTHORS: Atwell, R. J., Jr.; Sridharan, R.; Levie, R. de ;

CONTRACT NO. AFOSR-80-0262, AFOSR-84-0017

PROJECT NO 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0127

charging current components in dc polarography. The method involves only a weighted linear least squares analysis. Keywords: Capacitive current.

DESCRIPTORS: (U) *ELECTRIC CHARGE, *LEAST SQUARES METHOD, *DIRECT CURRENT, *POLAROGRAPHY, CORRECTIONS, LIMITATIONS, OXYGEN, SURFACES, ELECTROCHEMISTRY, OXIDATION, MERCURY, SENSITIVITY, REPRINTS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303A1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v194 p143-148 1985.

ABSTRACT: (U) The sensitivity of classical polarography is usually limited by the presence of the so-called residual current, of which the principal components are a current due to the reduction of remaining electroactive traces (such as oxygen) and a double layer charging current. The latter results mainly from the continually changing surface area of the growing mercury droplets, and is commonly the more serious limiting factor. The Faradaic current $i_{sub f}$ associated with electrochemical oxidation or reduction is often controlled by diffusional mass transport, in which case it can be described quite well by the Ilkovic equation, here written in condensed form as $i_{sub f} = at$ to the $1/6$ power where t denotes the age of the drop, i.e., the time elapsed since the particular drop first made contact with the solution. The proportionality constant contains the dependence of $i_{sub f}$ on concentration; in the limiting current region, $i_{sub f}$ is directly proportional to the concentration of the electroactive species in solution. On the other hand, the charging current is described by $i_{sub c} = bt$ to the $-1/3$ power where b is proportional to the product of the integral double layer capacitance of the electrode and its rational potential, i.e., its potential as measured versus the potential of zero charge. A simple method is described and illustrated to separate the faradaic and

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TUFTS UNIV MEDFORD MA DEPT OF PHYSICS

WUAFOSR2311A1

(U) VLA (Very Large Array) Observations of Solar Active Regions at Closely Spaced Frequencies. Evidence for Thermal Cyclotron Line Emission.

NOV 85 10P

PERSONAL AUTHORS: Willson, Robert F. ;

CONTRACT NO. AFOSR-83-0019, NAG5-501

PROJECT NO 2311

TASK NO A1

MONITOR: AFOSR
TR-86-0116

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Astrophysical Jnl., v298 p911-917, 15 Nov 85

ABSTRACT: (U) VLA observations of a solar active region at 10 closely spaced frequencies between 1440 and 1720 MHz are presented. The synthesis maps show, on two successive days, significant changes in the brightness temperature within this narrow frequency range. We show that these changes cannot be due to either thermal bremsstrahlung or gyroresonance emission from a coronal loop in which the temperature, density, or magnetic field varies monotonically with height. Instead, we attribute the brightness spectrum to cyclotron line emission from a narrow layer where the temperature is elevated above the surrounding part of the loop. Keywords: Very Large Arrays; Sun Radio Radiation; Cyclotron Lines; Magnetic Field Strength; Coronal Loops; Current Sheets; Reprints.

DESCRIPTORS: (U) *SOLAR RADIO MAPS, *CYCLOTRON RESONANCE, BRIGHTNESS, TEMPERATURE, CORONAS, LOOPS, MAGNETIC FIELDS, FREQUENCY, RANGE(EXTREMES), REPRINTS, REGIONS, SOLAR ACTIVITY, BREMSSTRAHLUNG, CYCLOTRONS, EMISSION SPECTRA, LINE SPECTRA, FIELD INTENSITY, LAYERS, SOLAR ACTIVITY, SOLAR CORONA, RADIO TELESCOPES, THERMAL PROPERTIES, THERMAL RADIATION, ARRAYS

IDENTIFIERS (U) VLA(Very Large Arrays), PE61102F.

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AD-A166 097 20/6

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SRI INTERNATIONAL MENLO PARK CA

(U) Spatiotemporal Characteristics of Visual Localization.

DESCRIPTORS: (U) VISIONICS, ACCURACY, HUMANS, OBSERVERS, MEASUREMENT, STIMULI, CONTRAST, DETECTION, THRESHOLD EFFECTS, HUMANS, VISION, MODELS, SPACE PERCEPTION, VISION PSYCHOPHYSICS

DESCRIPTIVE NOTE: Final rept 1 Jun 82-31 Aug 85,

IDENTIFIERS: (U) PE61102F

OCT 85 21P

PERSONAL AUTHORS Burbeck, Christina A. ;

CONTRACT NO F49620-82 K-0024

PROJECT NO 2313

TASK NO A5

MONITOR: AFOSR
TR 86 0109

UNCLASSIFIED REPORT

ABSTRACT (U) The main thrust of this research effort has been investigation of the spatial and temporal properties of the visual processes underlying relative spatial localization by human observers. The initial tasks were development of a suitable laboratory display system for generating the required stimuli, and development of appropriate experimental paradigms for studying the localization of widely separated objects. The second task was to make careful quantitative measurements of the spatial and temporal properties of the system underlying localization of widely separated objects. It was found that many of the stimulus manipulations that are critical in determination of contrast detection thresholds have little or no effect on localization accuracy. The relative localization of widely separated objects is a highly robust visual ability. Those variations in localization accuracy with changes in the spatial and temporal parameters of the stimulus that were obtained could readily be modeled as natural extensions of the threshold properties. The final task of this project was testing of existing models of spatial ability that can be accounted for by current models of spatial vision. Specific extensions of the existing model were suggested by the data. Keywords: Human vision, Visual psychophysics; Relative spatial localization

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 096 12/1

IOWA STATE UNIV AMES

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

DESCRIPTIVE NOTE: Interim rept. 30 Sep 84-15 Apr 85.

APR 85 10P

PERSONAL AUTHORS: Levine, Howard A. ;

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0047

UNCLASSIFIED REPORT

ABSTRACT: (U) The work in progress has included the result that, for a certain class of partial differential equations, nonlinearization will often not aid in stabilization. Partial results have been obtaining on the following two types of questions: (1) What sort of estimates can one obtain for solutions of nonlinear parabolic problems backward in time at a given time in terms of the solution at later times? Also: (2) If a solution of a certain parabolic boundary value problem is known to exist for positive time, what are the possible behaviors as the time tends to zero? Other topics addressed include coefficient determination in hyperbolic equations, quenching for wave equations, and positive solutions of a nonlinear elliptic equation in all of space. Two presentations will be given this summer on results to date. (Author)

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, NONLINEAR SYSTEMS, PARABOLAS, ESTIMATES, SORTING, SOLUTIONS(GENERAL), NONLINEAR ALGEBRAIC EQUATIONS, QUENCHING, WAVE EQUATIONS, BOUNDARY VALUE PROBLEMS

IDENTIFIERS: (U) PE61102F

AD A166 096

AD-A166 095 9/2

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Parallel Matrix Computations.

DESCRIPTIVE NOTE: Interim rept. 1983-1984.

MAR 85 13P

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

CONTRACT NO. AFOSR-82-0078

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0048

UNCLASSIFIED REPORT

ABSTRACT: (U) This project concerns the design and analysis of algorithms to be run in a processor-rich environment. We focus primarily on algorithms that require no global control and that can be run on systems with only local connections among processors. We investigate the properties of these algorithms both theoretically and experimentally. 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. To give our work direction, we have focused on two areas: 1. Dense problems from numerical linear algebra; and 2. The iterative and direct solution of sparse linear systems. We discuss in this summary the ZMOB hardware and the research projects that we have pursued under this grant support.

DESCRIPTORS: (U) *PARALLEL PROCESSING, ALGORITHMS, CONTROL, COMPUTATIONS, ITERATIONS, SOLUTIONS(GENERAL), LINEAR ALGEBRA, NUMERICAL ANALYSIS, LINEAR SYSTEMS, SPARSE MATRIX

IDENTIFIERS: (U) PE61102F

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AD-A166 094 7/4

GEORGETOWN UNIV WASHINGTON DC DEPT OF CHEMISTRY

(U) On the Statistics of Electrochemical Nucleation: Application of the Non-Homogeneous Poisson Distribution,

84 6P

PERSONAL AUTHORS: Sridharan, R. ; De Levie, R. ;

CONTRACT NO. AFOSR-80-0262, NSF-CHE82-14910

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-86-0129

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v169 p59-67 1984.

ABSTRACT: (U) When the rate of formation of electrochemical nuclei is a function of time, the appropriate statistics are those of the non-homogeneous Poisson distribution. Its explicit form is derived, and its relation to the usual Poisson distribution is indicated. The application of the non-homogeneous Poisson formalism to experimental data is illustrated, including a method to estimate the stoichiometry of the critical nucleus.

DESCRIPTORS: (U) *NUCLEATION, *STATISTICS, *ELECTROCHEMISTRY, NUCLEI, HETEROGENEITY, POISSON DENSITY FUNCTIONS, STOICHIOMETRY, DISTRIBUTION FUNCTIONS, EXPERIMENTAL DATA, REPRINTS

IDENTIFIERS: (U) PE61102F

AD-A166 094

AD-A166 093 7/4 9/5

COLUMBIA RADIATION LAB NEW YORK

(U) Instrumentation for Surface Studies for Novel Electronics Processing.

DESCRIPTIVE NOTE: Final rept. 15 Dec 84-14 Dec 85,
DEC 85 11P

PERSONAL AUTHORS: Osgood, R. M. ;

CONTRACT NO. AFOSR-85-0046

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-0051

UNCLASSIFIED REPORT

ABSTRACT: (U) The instrumentation purchased on this contract is to be used in the study of solid-surface phenomena and the relation of these phenomena to developing new processing or fabrication techniques for micro-electronics. Development of new processing techniques including laser direct writing, photon-assisted dry processing, the formation of metal silicide and ion etching are currently major research efforts in the Columbia Microelectronics Sciences Laboratories. The work is supported by research contracts with AFOSR, DARPA JSEP, and Rome Air Development Center. Author

DESCRIPTORS: (U) *ELECTRONICS, *ETCHING, *SURFACES, *SILICIDES, ION BEAMS, LASERS, METALS, METHODOLOGY, PROCESSING, RESEARCH MANAGEMENT, WRITING, FABRICATION, CONTRACTS

IDENTIFIERS: (U) PE61102F

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A166 092 CONTINUED

GEORGETOWN UNIV WASHINGTON D C

THERMODYNAMICS

(U) Electrosorption of Organic Molecules.

IDENTIFIERS: (U) Thymine, PE61102F

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 85.

SEP 85 15P

PERSONAL AUTHORS: De Levie, Robert ;

CONTRACT NO. AFOSR-84-0017

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR 86-0130

UNCLASSIFIED REPORT

ABSTRACT: (U) The maximum bubble pressure method was used to measure the interfacial tension of the mercury-solution interface in the presence of thymine. This particular adsorbate was selected because it can form, over a range of concentrations and potentials, a condensed film at the mercury water interface. A simple method was developed to determine, separately, the faradaic and charging components of the polarographic current, based on the different time-dependencies of these two components. Condensed thymine monolayers inhibit many electrode reactions. With these monolayers the surface pressure can be varied (by varying the bulk thymine concentration) without changing the composition of the film or its charge density. Research completed on thymine provides a uniquely thorough and comprehensive account of the thermodynamics and kinetics of film formation, a subject of considerable practical importance in corrosion protection, a subject of considerable practical importance in corrosion protection. Developed were a number of novel ideas and new experimental approaches.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *ADSORPTION, *URACILS, *METHYL RADICALS, MERCURY, WATER, CHARGE DENSITY, ELECTRODES, INTERFACIAL TENSION, PRESSURE, SURFACE PROPERTIES, CORROSION INHIBITION, MOLECULES, ORGANIC COMPOUNDS, SORPTION, FILMS, KINETICS.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK551

AD-A166 091 7/5 7/4 20/5
LA JOLLA INST CA
(U) Measurements of the Population of Excited Na Atoms in Laser-Excited Na Vapour.
DESCRIPTIVE NOTE: Interim rept. 1 May 85-30 Apr 86,
JAN 86 7P
PERSONAL AUTHORS: Tang, S. Y.; Wang, D. P.; Neynaber, R. H.;
CONTRACT NO. F49620-85-C-0070
PROJECT NO. 2301
TASK NO. A4
MONITOR: AFOSR
TR 86-0117

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physics B: Atomic and Molecular Physics, v19 pL25-L30 1985.

ABSTRACT: (U) A beam-gas method is described for measuring the fraction of laser-excited atoms in Na vapour. Both single-mode and broad radiation is used at the frequency of the sodium D1 or D2 line. The method is based on measurements of ion pair production from collisions of ground-state Na and Cl. Since ion pairs are not produced with excited Na, the f^* can be determined from measurements with the laser on and off. Keywords: Laser excitation; Molecular beams; Ion pair production; Reprints; Sodium; Chlorine.

DESCRIPTORS: (U) *LASER PUMPING, *IONIZATION, *PAIR PRODUCTION, *SODIUM, ATOMS, COLLISIONS, GROUND STATE, MOLECULAR BEAMS, REPRINTS, CHLORINE, IONS, EXCITATION, POPULATION

AD-A166 091

AD-A166 088 20/13 20/4 7/4
RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

(U) Effect of Interfacial Phenomena on Contact Line Heat Transfer. I.

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

OCT 85 9P

PERSONAL AUTHORS: Wayner, Peter C., Jr;

CONTRACT NO. AFOSR-84-0306

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-0084

UNCLASSIFIED REPORT

ABSTRACT: (U) The heat transfer characteristics of the contact line region of an evaporating thin liquid film were studied experimentally and theoretically. The effects of composition and temperature gradients on surface shear were analyzed and the results were successfully compared with previously reported experimental trends. The use of a constant vapor pressure boundary condition allowed the relative effects of surface tension, composition and temperature on fluid flow to be mapped. A small heat transfer cell was designed, built and used on the scanning stage of a scanning microphotometer. The unique use of a microphotometer allows the microscopic detail to be measured. The preliminary results are being analyzed to evaluate the effect of capillarity on the evaporating meniscus in heat pipes. Additional development work on the heat transfer cell is required. Modeling studies are being extended. Keywords: Heat transfer; Interfacial phenomena; Surface shear; Evaporation; Heat pipes; Capillarity; Distillation; Thin liquid films.

DESCRIPTORS: (U) *HEAT PIPES, *HEAT TRANSFER, *INTERFACES, *THIN FILMS, MICROPHOTOMETERS, CAPILLARITY, DISTILLATION, CELLS, MODELS, SHEAR PROPERTIES, SURFACES, TEMPERATURE GRADIENTS, BOUNDARIES, CONSTANTS, VAPOR

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 088 CONTINUED

PRESSURE, EVAPORATION, INTERFACIAL TENSION, FLUID FLOW,
TEMPERATURE, LIQUIDS, PATTERNS

IDENTIFIERS: (U) Meniscus, Surface shear, Thin liquid
films, PEG1102F

AD-A166 085 7/3 7/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
CHEMISTRY

(U) Chemistry of New Silicon Containing Polymers Triply
Bonded Silicon Intermediates.

DESCRIPTIVE NOTE: Final rept. 31 Aug 82-31 Oct 85.

DEC 85 11P

PERSONAL AUTHORS: Weber, William P. ;

CONTRACT NO. AFOSR-82-0333

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0131

UNCLASSIFIED REPORT

ABSTRACT: (U) A method to generate (O=Si=O) in the gas phase by flash vacuum pyrolysis (FVP) of 2,3:4,7 diepoxy 5-silaspiro (4,4) nonane was developed. Reactive pi-bonded silicon nitrogen double bonds intermediates were generated by FVP of dimethoxymethylsilyl-bis (trimethylsilyl) amine. Photolysis of dodecamethylcyclohexasilane yields both dimethylsilylene and methylsilylene. The oxidation of dimethylsilylene with sulfoxides yields silanones. Sterically hindered T-butyl dimethyl-silane permits control in the silyl hydroformylation reaction. Keywords: Silanes, Silanones.

DESCRIPTORS: (U) *SILICON COMPOUNDS, *PYROLYSIS, *POLYMERS, CHEMICAL BONDS, SILICON, FLASHES, VACUUM, VAPOR PHASES, SILANES

IDENTIFIERS: (U) Silanones, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 075 9/5 9/1 20/6

AD-A166 075 CONTINUED

POLYTECHNIC INST OF NEW YORK BROOKLYN MICROWAVE RESEARCH
INST

WAVES, PHYSICS, INTERACTIONS

(U) Basic Research in Electronics (JSEP).

IDENTIFIERS: (U) PE61102F, WUAF0SR2305A9

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 85.

DEC 85 88P

PERSONAL AUTHORS: Oliner, Arthur A. ;

REPORT NO. POLY-MRI-1446-85

CONTRACT NO. F49620-85-C-0078

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFC'R
TR-86-0078

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents a summary of the scientific progress and accomplishments on research projects funded by the Joint Services Electronics Program (JSEP) for the contract periods from 1 January 1985 through 31 December 1985. It does not contain information regarding accomplishments on research projects funded in other ways. The Joint Services Electronics Program at the Polytechnic is the core of interdisciplinary research in electronics encompassing programs in the Departments of Electrical Engineering, Physics and Chemistry under the aegis of the Microwave Research Institute. The research encompassed by this program is grouped under three broad categories: Electromagnetics, Solid State Electronics and Information Electronics. The detailed projects (research units) comprising the complete program are listed in the Table of Contents. Keywords include: Electromagnetics, Microwaves, Millimeter waves, Waveguides and antennas, Optics, x-rays, Solid state interactions, Solid state materials, Information electronics, Systems, and Restoration.

DESCRIPTORS: (U) *ANTENNAS, *OPTICS, *SOLID STATE
ELECTRONICS, *WAVEGUIDES, ELECTRICAL ENGINEERING,
ELECTRONICS, MICROWAVES, SOLIDS, CHEMISTRY, MILLIMETER

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 074 6/16 5/10

AD-A166 074 CONTINUED

CALIFORNIA UNIV MEDICAL CENTER LOS ANGELES

(U) Neurophysiological Research Supporting the
Investigation of Adaptive Network Architectures.

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

AUG 85 90P

PERSONAL AUTHORS: Woody, Charles D. ;

CONTRACT NO. F49620-83-C-0077

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFDSR
TR-86-0083

understand how the system picks the right pathway to give
both acceleration and the appropriate learned movement.

DESCRIPTORS: (U) *ADAPTATION, *NEUROPHYSIOLOGY, *NERVE
CELLS, *LEARNING, NERVE TRANSMISSION,
STIMULATION(PHYSIOLOGY), ACCELERATION, ARCHITECTURE,
NETWORKS, CEREBRAL CORTEX, HYPOTHALAMUS, MOTOR REACTIONS,
CASCADE STRUCTURES, MOLECULES, ELECTRIC CURRENT, ERRORS,
RATIOS, ACQUISITION, SURVIVABILITY, INFORMATION
PROCESSING, INFORMATION SYSTEMS, SELF ORGANIZING SYSTEMS,
HEARING, STIMULI

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigators have shown that single
cortical neurons adapt in such a way as to support
learned behavior. What is particularly interesting is the
indication that purposefully complex, molecular cascades
exist at the level of single nerve cells to permit
successful adaptations to occur. Successful adaptations are
defined as: a) producing the desired alteration of
response to the appropriate input, b) enduring over time,
c) not interfering with other adaptations occurring for
other purpose in the same cell, and d) not interfering
with the main-throughput-message transfer property of the
nerve cell. The result of these adaptations is to support
the operation of a self-organizing information processing
system with a high success: error ratio and excellent
survivability in the face of substantial environmental
change. Changes in the excitability of cortical neurons
occur that lead to acquisition of the ability to perform
specific motor tasks in response to specific auditory
stimuli. Rates of acquiring this ability can be
substantially increased by adding electrical stimulation
of the hypothalamus associatively, to presentations of
conventional conditioned and unconditioned stimuli. Part
of this acceleration of learning the motor response may
derive from recruitment of a new performance pathway-
reflected in a longer transmission latency for movement
production. A long range goal of the research is to

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AD-A166 073 12/1

AD-A166 073 CONTINUED

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Analysis, Modeling and Control of Dynamical Systems.

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

SEP 84 15P

PERSONAL AUTHORS: Banks, H. T.; Hale, J. K.;

CONTRACT NO. AFOSR-81-0198

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-86-0060

DISTRIBUTION, DYNAMICS, ELASTIC PROPERTIES, EQUATIONS; ESTIMATES, IDENTIFICATION, INSECTS, INVERSION, LINEARITY, APPROXIMATION (MATHEMATICS), ASYMPTOTIC SERIES, PARABOLAS, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, REGULATORS, RESPONSE, STATICS, TRANSPORT PROPERTIES, SPLINES; GEOMETRY

IDENTIFIERS: (U) Inverse problems, Neumann Boundary value problems, PE61102F, WUAFOSR2304A4

UNCLASSIFIED REPORT

ABSTRACT: (U) This work involves investigations in reaction diffusion equations with Neumann boundary conditions, numerical approximations of the attractor for abstract evolutionary equations which include the Navier Stokes equation, and in computational methods for control and identification of processes governed by distributed parameter systems. Contents: Inverse problems for hyperbolic systems with unknown boundary parameters; Parameter identification in continuum models; Modeling of flexible surfaces: A preliminary study; The linear regulator problem for parabolic systems; Computational methods for estimation of parameters in hyperbolic systems; Estimation of temporally and spatially varying coefficients in models for insect dispersal; Spline based estimation techniques for parameters in elliptic distributed systems; A spline-based parameter and state estimation technique for static models of elastic surfaces; Estimation techniques for transport equations; Large diffusivity and asymptotic behavior in parabolic systems; and Varying boundary conditions with large diffusivity

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *CONTROL THEORY, *DIFFUSION THEORY, *NAVIER STOKES EQUATIONS, DIFFUSION, BOUNDARIES, COEFFICIENTS, CONTINUUM MECHANICS, DIFFUSIVITY, DISPERSING.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

AD-A166 072 6/20

WRIGHT STATE UNIV DAYTON OHIO DEPT OF CHEMISTRY

(U) The Metabolism of CIS - and Trans - Decalin in Fischer 344 Rats.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 84-31 Jul 85.

DEC 85 20P

PERSONAL AUTHORS: Serve, M. P. ;

CONTRACT NO. AFOSR-84-0152

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-86-0050

AD-A166 072 CONTINUED

showed that cis-decalin was metabolized to cis, trans-1-decalol, cis, cis-1-decalol and cis, cis-2-decalol while trans-decalin was converted to trans, trans-1-decalol and trans, cis-2-decalol. Kidney extracts of male Fischer 344 rats showed the presence of 2-decalones. Keywords: Decalin; decahydronaphthalene.

DESCRIPTORS: (U) *NAPHTHALENES, *KIDNEYS, *TOXICITY, HYDROCARBONS, FEMALES, RATS, ISOLATION, KETONES, LESIONS, METABOLISM, BODIES, DROPS, MALES, METABOLITES, GAIN, WEIGHT REDUCTION, URINE

IDENTIFIERS: (U) Naphthalene/Decahydro, Hyaline, PEG1102F, WUAFOSR2312AS

UNCLASSIFIED REPORT

ABSTRACT: (U) A study by Inman et al. showed that the Air force Cruise Missile fuel JP-10, a C10 cyclic hydrocarbon with the chemical name exo-2,3,3a,4,5,6,7,7a-octahydro-4,7-methano-1H-indene (I), produced kidney lesions in Fischer 344 male rats. Using 14C labeled JP-10, Inman found the hydrocarbon was distributed throughout the rat's body. A metabolic study of JP-10 showed the presence of the alcohol exo-5-hydroxy-exo-2,3,3a,4,5,6,7,7a-octahydro-4,7-methano-1H-indene (II) in the urine. Homogenization and extraction of the rat's kidney resulted in the isolation of the ketone, 5-keto-exo-2,3,3a,4,5,6,7,7a-octahydro-4,7-methano-1H-indene (III). No ketone was found in the urine. Based upon the work of Inman, it was hypothesized that the metabolites of high-boiling cyclic hydrocarbons may provide valuable information regarding the renal toxicity mechanism. It was proposed that the metabolism of other cyclic hydrocarbons be examined to see if a commonality of metabolism yielded similar toxic effects. The first chemical to be examined was decalin (IV). Male and female Fischer 344 rats were administered cis- and trans-decalin intragastrically. The male rats were more affected than the female rats as evidenced by reduced weight gain and appearances of hyaline droplet formation in the proximal tubules. Urine studies in both male and female rats

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AD-A166 071 7/3 21/2

AD-A166 071 CONTINUED

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Fundamental Studies of Laser Interaction in Materials
Preparation: New Aspects of Chemical Vapor Deposition,
Trichlorosilane, Literature Survey and Combustion
Experiments.

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

MAR 84 44P

PERSONAL AUTHORS: Mores, T. F. ;

CONTRACT NO. AFOSR-83-0632

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-0054

DESCRIPTORS: (U) *LASER APPLICATIONS, *VAPOR DEPOSITION,
*COMBUSTION, *TRICHLOROSILANE, CORRECTIONS, EVAPORATION,
FLAMMABILITY, HEAT OF COMBUSTION, CHEMICAL REACTIONS,
HYDROGEN, IMPACT, INFRARED SPECTRA, INTERACTIONS, LASERS,
ABSORPTION SPECTRA, LITERATURE SURVEYS, MASS, MATERIALS,
PREPARATION, PRODUCTION, CALORIMETRY, PYROLYSIS,
REDUCTION, RESPONSE, SILICON, TEST METHODS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1

UNCLASSIFIED REPORT

ABSTRACT: (U) Various properties and reactions of trichlorosilane (SiHCl₃) have been studied to obtain information on the combustion of trichlorosilane. The infrared absorption spectra, impact flammability results and the heat of formation of SiHCl₃ are included in this paper. The production of silicon from trichlorosilane by thermal decomposition and hydrogen reduction is reviewed to point out certain reaction characteristics of SiHCl₃. The combustion of trichlorosilane is studied in detail. Two reactions are proposed as being the combustion and are as follows: (1) 5SiHCl₃ + O₂ yields 5SiO₂ + HCl + 7Cl₂ + 2H₂O; and (2) SiHCl₃ + O₂ yields SiO₂ + HCl + Cl₂. Having no basis on which to determine which of the two reactions is the actual combustion reaction, both are considered in this paper. The theoretical heat of combustion for reaction 1 is -815.3 cal/g and for reaction 2 is -774.9 cal/g. Combustion experiments were performed with trichlorosilane using a Parr semimicro calorimeter. The amount of SiHCl₃ lost by evaporation between the time the sample was weight and ignited was estimated. Using this corrected mass value, the heat of combustion of trichlorosilane was found to be -803.8 cal/g, which tends to indicate that reaction 1 above, dominates.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 070 9/4 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Remarks on Certain Criteria for Detection of Number of Signals.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 15P

PERSONAL AUTHORS: Zhao, L. C.; Krishnaiah, P. R.; Bai, Z. D.

REPORT NO. TR-85-43

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0063

UNCLASSIFIED REPORT

ABSTRACT: (U) In this note, we derive the asymptotic distribution of algorithm of the likelihood ratio statistic for testing the hypothesis that the number of signals is equal to q against the alternative that it is equal to k (specified) for a special case. The distribution is not chi-square. The above statistic also arises (see Wax and Kailath (1985)) in studying consistency property of MDL and AIC criteria for detection of the number of signals. Keywords included: Information theoretic criteria, Multivariate distribution theory, and Signal detection.

DESCRIPTORS: (U) *INFORMATION THEORY, *MULTIVARIATE ANALYSIS, ALGORITHMS, ASYMPTOTIC SERIES, DETECTION, SIGNALS, WAXES, CONSISTENCY, HYPOTHESES, DISTRIBUTION THEORY

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD A166 070

AD-A166 069 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Branched Perfluoro Ethers by Direct Fluorination. Copolymers Based on Hexafluoroacetone.

85 6P

PERSONAL AUTHORS: Persico, D. F.; Lagow, R. J.;

CONTRACT NO. AFOSR-82-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR 86-0119

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v18 n7 p1383-1387 1985.

ABSTRACT: (U) The copolymerization of hexafluoroacetone with ethylene oxide, propylene oxide, and trimethylene oxide and subsequent fluorination utilizing elemental fluorine have led to the synthesis of new perfluoro ethers. The syntheses of volatile perfluoro ethers along with perfluoro oligometric oils from the starting copolymers are reported. Characterization of these new copolymers along with ^{19}F and ^{13}C NMR studies and TGA analyses are discussed.

DESCRIPTORS: (U) *COPOLYMERIZATION, *FLUORINATION, *ETHERS, *SYNTHESIS(CHEMISTRY), ETHYLENE OXIDE, OILS, SYNTHESIS, OXIDES, PROPENES, NUCLEAR MAGNETIC RESONANCE, THERMOGRAVIMETRIC ANALYSIS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 068 7/3

AD-A166 068 CONTINUED

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A New Synthesis for (Trifluoromethyl)thio
Organometallic Compounds by Low-Temperature
Cocondensation of (Trifluoromethyl)thio Radicals and
Metal Vapor.

83 3P

PERSONAL AUTHORS: Bierschenk, Thomas R. ; Lagow, Richard J. ;

CONTRACT NO. AFOSR-82-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0114

frequency power delivered to the plasma had little effect
on the ratio of SCF3 to CF3 radicals.

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS,
*SYNTHESIS(CHEMISTRY), *ORGANIC SULFUR COMPOUNDS,
*CONDENSATION REACTIONS, METAL VAPORS, STRENGTH(GENERAL),
POWER, RADIOFREQUENCY, GLOW DISCHARGES, LOW TEMPERATURE,
SYNTHESIS, RATIOS, METALS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v22 p359-
360 1983.

ABSTRACT: (U) This paper reports work involving the
reaction of metal vapor with (trifluoromethyl) thio
radicals. The radicals were produced in a low-temperature
glow discharge of bis (trifluoromethyl) disulfide. The
synthesis of (trifluoromethyl) thio organometallic
compounds, in spite of the fact that the discharge
precursor for this radical is much less specific or
selective than in previously reported work emphasizes one
to the strengths of this reaction pathway to sigma bonded
organometallic compounds. The advantage is specifically
that it is not necessary to have an extremely clean
source of radicals in order to affect the reaction. Here
the critical factor is simply the statistics of the
recombination of metals with radicals. One obtains the
statistically expected percentage of the homoleptic
compound based on the relative concentrations of each
radical present. The reaction of (trifluoromethyl) thio
radicals generated in a low-temperature glow discharge
provides a synthetic route to highly substituted
(trifluoromethyl) thio organometallic compounds. In
addition to the SCF3 radical, CF3 radicals were also
produced in a ratio of approximately 2.7 to 1 and
resulted in additional products. Reducing the radio

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TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The First Perfluoro Crown Ethers.

85 5P

PERSONAL AUTHORS: Lin, Wen-Huey ; Bailey, Webb I. , Jr. ;
Lagow, Richard J .

CONTRACT NO. AFOSR-82-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0118

, VOLATILITY, CRYSTAL STRUCTURE, MOLECULAR STRUCTURE,
BIOMEDICINE, HYDROCARBONS, OXYGEN, SINGLE CRYSTALS,
CHEMICAL WARFARE, THERMAL DEGRADATION, LIGANDS,
STRUCTURES, SYNTHESIS, REPRINTS

IDENTIFIERS: (U) Crown ethers, WUAFOSR2303B2, PE61102F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society,
Chemical Communications, v19 p1350-1352 1985.

ABSTRACT: (U) The first perfluoro crown ethers, perfluoro 18-crown-6, perfluoro 15-crown-5, and perfluoro 12-crown-4, have been prepared by carefully controlled elemental fluorination; although they are weaker bases than their parent compounds, perfluoro crown ethers are materials which will have a number of applications. Perfluorinated derivatives of hydrocarbon compounds usually exhibit different properties than their hydrocarbon analogues. The perfluoro crown ethers are markedly more volatile than the hydrocarbon products. Single crystals have been grown of 18-crown-6 and preliminary structural information indicates that the ring is puckered in a manner so that oxygen is exposed and projected toward a metal co-ordination site. In addition to the possibility of serving normal functions as macrocyclic ligands, the compounds are of interest in the biomedical and oxygen carrier areas for they are definitely physiologically compatible with human and other mammalian tissue. This synthetic breakthrough opens the possibility of preparation of many novel crown ether systems as well as the synthesis of perfluoro cryptands. Such ligands should be much less subject to chemical attack or thermal degradation.

DESCRIPTORS: (U) *FLUORINATION, *ETHERS, BASES(CHEMISTRY)

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A166 066 CONTINUED

SRI INTERNATIONAL MENLO PARK CA

(U) On the Control of Magnetospheric Convection by the
Spatial Distribution of Ionospheric Conductivities.

JAN 86 25P

PERSONAL AUTHORS: Senior, Catherine ;Blanc, Michel ;

CONTRACT NO F49620-83-K-0005

PROJECT NO 2310

TASK NO A2

MONITOR: AFOSR
TR 85-1250

DESCRIPTORS: (U) *AURORAE, *CONVECTION, *MAGNETOSPHERE,
APPROXIMATION(MATHEMATICS), CAVITIES, CONDUCTIVITY,
CONTROL, AMPLITUDE, DIURNAL VARIATIONS, EDGES, ELECTRIC
FIELDS, ELECTRONS, FIELD THEORY, HARMONICS, INCOHERENT
SCATTERING, IONOSPHERE, LINEAR SYSTEMS, MATHEMATICAL
MODELS, PRECIPITATION, IONIC CURRENT, MAGNETIC STORMS,
ALIGNMENT, REPRINTS, SCATTERING, SHIELDING, SPATIAL
DISTRIBUTION, STATISTICAL ANALYSIS, STEADY STATE, TIME
DEPENDENCE

IDENTIFIERS: (U) WUAFOSR2310A2, PE61102F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Jnl of Geophysical Research,
v89 nA1 p251-284, 1 Jan 84.

ABSTRACT: (U) A self-consistent semianalytical model of
magnetospheric convection including the effect of
conductivities is presented. The motions of the inner
edge of the magnetospheric ring current, and the
associated field-aligned currents, produced by the
externally imposed dawn-to-dusk potential drop across the
magnetospheric cavity are computed by using a linear
approximation. The coupling between the different diurnal
harmonics in the local time variations of fields and
currents produced by the local time dependence of
ionospheric conductivities is described by an appropriate
matrix formalism. The calculations show that the
enhancement of auroral conductivities by electron
precipitation in the auroral zone significantly enhances
both the typical duration and the absolute amplitude of
the penetration of convection electric fields to
midlatitudes. Furthermore, the local time variations of
the convection electric field generated at midlatitudes
by a sudden increase of the dawn-to dusk potential drop
are in good agreement, both at the initial time and after
the steady state is reached, with the available
statistical models of the disturbance midlatitude
electric field. Keywords: Incoherent scatter; ionosphere;
magnetosphere; electric fields; substorms; auroral zone;
shielding of electric fields; Reprints

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 065 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Dimethylsilylene: A Trisilane and a Geminal Diazide as New Photochemical Precursors. Evidence for an Absorption Maximum Near 450 nm.

85 3P

PERSONAL AUTHORS: Vancik, Hrvoj ; Raabe, Gerhard ; Michalczyk, Michal J. ; West, Robert ; Michl, Josef ;

CONTRACT NO. F49620-83-C-0044

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-86-0151

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemistry Society, v107 p4097-4098 1985.

ABSTRACT: (U) UV irradiation of matrix-isolated dimethyldiazidosilane and of a glassy solution of 1,3-diphenylhexamethyltrisilane produces dimethylsilylene, characterized by its visible λ_{max} = 450 nm and infrared absorption. The evidence for the structural assignment of this species, which has now been prepared from seven widely different precursors, is summarized. It is proposed that it rules out a recent alternative assignment of the dimethylsilylene structure to a flash-photolysis transient absorbing at λ_{max} = 350 nm.

DESCRIPTORS: (U) *SILANES, *PHOTOCHEMICAL REACTIONS, ABSORPTION, INFRARED RADIATION, IRRADIATION, ISOLATION, ULTRAVIOLET RADIATION, PRECURSORS, SOLUTIONS (GENERAL), VITREOUS STATE, REPRINTS

IDENTIFIERS: (U) Silane/dimethyldiazido, Silane(tri)/1,3-diphenylhexamethyl, Silylene/dimethyl, PE61102F, WUAFOSR2303B2

AD A166 065

AD-A166 064 20/12

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Observation of Anticrossing between Zeeman-Split $1s(T_2)$ States of Opposite Spin for As Donors in Germanium.

SEP 85 10P

PERSONAL AUTHORS: Youngdale, E. R. ; Larsen, D. M. ; Aggarwal, R. L. ;

CONTRACT NO. F49620-84-C-0010

PROJECT NO. 2306

TASK NO. C2

MONITOR: AFOSR
TR-86-0098

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v32 n6 p3938-3956, 15 Sep 85.

ABSTRACT: (U) Four wave spectroscopy has been used to study the Raman allowed $1s(A_1)$ to $1s(T_2)$ transitions of As donors in Ge at 1.8 K, using magnetic field B up to 12 T. With B parallel to $\langle 111 \rangle$ the $1s(T_2)$ states split into six levels (including spin), two with high and four with low diamagnetism. An anticrossing, predicted by People and Wolff, has been observed between donor levels of opposite spin. Valley repopulation due to breaking of the tetrahedral symmetry by the magnetic field is also observed. A theory has been developed, which, with no adjustable parameters, provides good agreement with experiment. Keywords: Tetrahedral; reprints.

DESCRIPTORS: (U) *GERMANIUM, *SPIN STATES, *ELECTRON DONORS, MAGNETIC FIELDS, PARAMETERS, REPRINTS, SPECTROSCOPY, SYMMETRY, DIAMAGNETISM, ZEEMAN EFFECT, RAMAN SPECTRA, ELECTRON TRANSITIONS

IDENTIFIERS: (U) Four wave spectroscopy, Tetrahedral semiconductors, PE61102F, WUAFOSR2306C2

AD-A166 064

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 063 7/4 20/8

AD-A166 062 9/2

ARIZONA UNIV TUCSON DEPT OF PHYSICS

NORTHERN ILLINOIS UNIV DE KALB

(U) Time-of-Flight Spectroscopy of Ionic and Metastable Fragments from Dissociating Molecules.

(U) Sequential and Parallel Matrix Computations.

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 80-14 Jun 85.

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

OCT 85 40P

NOV 85 6P

PERSONAL AUTHORS: Lamb, Willis E., Jr.; McIntyre, L. C., Jr.

PERSONAL AUTHORS: Datta, Biswa N. ;

CONTRACT NO. AFOSR-80-0218

CONTRACT NO. AFOSR-83-0334

PROJECT NO. 2301

PROJECT NO. 2304

TASK NO. A4

TASK NO. A3

MONITOR: AFOSR
TR-86-0071

MONITOR: AFOSR
TR-86-0067

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This research involved the dissociation of hydrogen-containing molecules by electron impact and the subsequent measurement of the velocity of proton or metastable hydrogen fragments using time-of-flight methods. The proton velocity distribution resulting from dissociation of the hydrogen halides resulted in information on excited states of the corresponding molecular ions with inner-shell electron holes. Another completed project involved the proton velocity distribution from electron bombardment of the triatomic molecules, water and hydrogen sulfide. A final experiment involved the detection, in coincidence, of proton and metastable hydrogen fragments from electron bombardment of hydrogen molecules.

ABSTRACT: (U) The major objectives of this project are to develop computational algorithms, both sequential and parallel, for several important linear algebra problems that arise in the design and analysis of linear control systems governed by the systems of ordinary differential equations. These include controllability problems, stability and inertia problems, pole assignment problems, matrix equations problems, relative primeness of polynomials and matrices and the cauchy-index problems of rational functions etc. Besides, a part of the project is devoted to the theoretical study of the parallel arithmetic complexity of these problems; that is, how fast these problems can be solved in parallel assuming that sufficiently many processors are available. Though some numerically viable sequential algorithms have been designed for some of these problems in recent years, parallel algorithms and algorithms for large scale problems are virtually non-existent.

DESCRIPTORS: (U) *HYDROGEN, *MOLECULAR IONS, *PROTONS, *CHEMICAL DISSOCIATION, *SPECTROSCOPY, FRAGMENTS, METASTABLE STATE, DISSOCIATION, ELECTRON IMPACT SPECTRA, HYDROGEN COMPOUNDS, DETECTION, ELECTRON IRRADIATION, DISTRIBUTION, VELOCITY, EXCITATION, HOLES (ELECTRON DEFICIENCIES), HYDROGEN SULFIDE, TIME, WATER

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTATIONS, *PARALLEL PROCESSING, CONTROL SYSTEMS, DIFFERENTIAL EQUATIONS, INERTIA, LINEAR ALGEBRA, LINEAR SYSTEMS, POLYNOMIALS, RATIONAL FUNCTIONS, SEQUENCES, VIABILITY, MATRICES (MATHEMATICS), SYSTEMS ANALYSIS

IDENTIFIERS: (U) WUAFOSR2301A4, PE61102F

IDENTIFIERS: (U) *Sequential processing, WUAFOSR2304A3, PE61102F

AD A166 063

AD-A166 062

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 061 20/4

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MATHEMATICS

(U) Final Report for Grant AFOSR-82-0213.

DESCRIPTIVE NOTE: Rept. for 1 Jun 82-30 Jun 85,

DEC 85 4P

PERSONAL AUTHORS: Nicolaidis, R. A. ;

CONTRACT NO. AFOSR-82-0213

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0070

UNCLASSIFIED REPORT

ABSTRACT: (U) This effort was focused on basic work on the numerical solution of the Navier-Stokes equations for incompressible flows. A basic problem in this theory is the compatibility of the finite element space used to approximate the pressure field. The investigator was able to devise a simple test of the finite element space. An inspection of the solution to this linear system immediately reveals whether the proposed scheme is stable. A second area of activity was an investigation of the applicability of the stream function formulation of the Navier-Stokes equations. This effort resulted in a number of publications in the scientific literature. Author

DESCRIPTORS: (U) *INCOMPRESSIBLE FLOW, *NAVIER STOKES EQUATIONS, FUNCTIONS(MATHEMATICS), FORMULATIONS, LINEAR SYSTEMS, FINITE ELEMENT ANALYSIS, STABILITY, NUMERICAL ANALYSIS, PRESSURE, SOLUTIONS(GENERAL)

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F

AD-A166 059 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Tables for Obtaining Confidence Bounds for Realized Signal to Noise Ratio with an Estimated Discriminant Function.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 17P

PERSONAL AUTHORS: Khatri, C. G. ; Rao, C. Radhakrishna ; Sun, Y. N. ;

REPORT NO. TR-85-40

CONTRACT NO. N00014-85-K-0292, F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0062

UNCLASSIFIED REPORT

ABSTRACT: (U) Percentage points of a new distribution involving a confluent-hypergeometric distribution obtained by Khatri and Rao are tabulated. The use of the tabulated values in obtaining a lower confidence bound for the realized signal to noise ratio based on an estimated discriminant function for signal detection is explained. Keywords: Random variables; Normal distribution; Probability density functions; Tables (data) . (Author)

DESCRIPTORS: (U) *TABULATION PROCESSES, DETECTION, DISCRIMINATE ANALYSIS, ESTIMATES, FUNCTIONS, NORMAL DISTRIBUTION, PROBABILITY DENSITY FUNCTIONS, RANDOM VARIABLES, SIGNAL TO NOISE RATIO, SIGNALS, VALUE, TABLES(DATA), CONFLUENCE, HYPERGEOMETRIC FUNCTIONS

IDENTIFIERS: (U) Confidence bounds

AD-A166 061

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A166 058 12/1

AD-A166 058 CONTINUED

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

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

IDENTIFIERS: (U) *Fast parallel algorithms, Trees(mathematics), Acyclic graphs

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 28P

PERSONAL AUTHORS: Pawagi, Shaunak ; Ramakrishnan, I. V. ;

REPORT NO. CAR-TR-124, CS-TR-1502

CONTRACT NO. N00014-84-K-0530, NSF-ECS84-04399

MONITOR: AFOSR
TR-86-0045

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contract F49620-83-C-0082.

ABSTRACT: (U) Fast parallel algorithms are presented for updating the distance matrix, shortest paths for all pairs and biconnected components for an undirected graph and the topological ordering of vertices of a directed acyclic graph when an incremental change has been made to the graph. The kinds of changes that are considered here include insertion of a vertex of insertion and deletion of an edge or a change in the weight of an edge. The machine 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 $O(N \log n)$ processors. These algorithms are efficient when compared to previously known $O(\log^2 n)$ time start-over algorithms for initial computation of the above mentioned properties of graphs. The previous solution is maintained in multiple inverted trees (a rooted tree where a child node points toward its parent) and after a minor change the new solution is rapidly recomputed from these trees.

DESCRIPTORS: (U) *GRAPHS, ALGORITHMS, COMPUTER APPLICATIONS, MATRICES(MATHEMATICS), PATHS, PARALLEL PROCESSING, POSITION(LOCATION), SOLUTIONS(GENERAL), TREES, SHORT RANGE(DISTANCE), INVERSION

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK55I

AD-A166 057 17/8 20/6

CINCINNATI UNIV OH SOLID STATE ELECTRONICS LAB

(U) Integration of Detectors with Optical Waveguide Structures.

DESCRIPTIVE NOTE: Final rept. 14 Mar 81-15 Mar 85.

NOV 85 33P

PERSONAL AUTHORS: Boyd, J. T. ; Jackson, H. E. ;

CONTRACT NO. AFOSR-81-0130

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-86-0099

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes results accomplished under the subject grant with many details appearing in other publications referenced in this report. Major accomplishments described occurred in the three major areas. First, laser recrystallization of silicon was used to fabricate photodetectors having excellent performance directly on the surface 10 to the minus 12th power amps, breakdown voltages of 60-80 V, and dynamic ranges of 55-60 db were measured. Second, a new type of optical waveguide using SiO2 was developed which was characterized by very low values of propagation loss. We measured values of loss as low as .06 db/cm. Third, operation of a ring resonator formed using optical channel waveguides formed in SiO2 was demonstrated and is described. Keywords included: Photodetector, Waveguides, and Recrystallization.

DESCRIPTORS: (U) *INTEGRATION, *OPTICAL WAVEGUIDES, *PHOTODETECTORS, DYNAMIC RANGE, LASERS, RECRYSTALLIZATION, SILICON, TRANSMISSION LOSS, WAVEGUIDES, DETECTORS, CHANNELS, STRUCTURES, LOSSES, VALUE

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A1

AD A166 057

AD-A166 056 12/1

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

(U) Development and Application of the p-version of the Finite Element Method.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-29 Sep 85.

NOV 85 35P

PERSONAL AUTHORS: Katz, I. Norman ;

CONTRACT NO. AFOSR-82-0315

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0087

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) The p-version of the finite element method is a new, important, computationally efficient, approach to finite element analysis. It is more robust than the conventional h-version and its rate of convergence, for domains with corners and for other singularity problems, is twice that of the h-version. Hierarchic elements which implement the p-version efficiently have been formulated so as to enforce C(0) or C(1) continuity in the planar case, and so as to enforce C(0) continuity in three dimensions. Keywords: Finite Element Analysis; Stress Analysis; Hierarchic Families of Finite Elements; p version of the Finite Element Method; Stress Intensity Factors; Numerical Analysis.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, CONVERGENCE, NUMERICAL ANALYSIS, PLANAR STRUCTURES, RATES, STRESS ANALYSIS, STRESS CONCENTRATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

AD-A166 055 12/1

WISCONSIN UNIV-MILWAUKEE DEPT OF MATHEMATICAL SCIENCES

(U) Sieves for Gaussian Processes.

DESCRIPTIVE NOTE: Annual rept 30 Sep 84-29 Sep 85.

NOV 85 6P

PERSONAL AUTHORS: Beder, Jay H. ;

CONTRACT NO AFOSR-84-0329

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0069

UNCLASSIFIED REPORT

ABSTRACT: (U) The PI has established several important properties of a proposed sieve estimator for the mean of a Gaussian process of known covariance. The estimator is itself a Gaussian process; under a separability assumption, it is asymptotically unbiased and weakly consistent at each time t , and is strongly consistent (globally) in an appropriate norm. For a Gaussian process with zero mean and unknown covariance, the PI has shown that the likelihood for the covariance is in general unbounded almost surely. Moreover, he has developed properties of a proposed sieve estimator for the covariance analogous to those for the mean. No assumption is made about the nature of the time parameter t , either for the mean estimator or for the covariance estimator. Keywords: Hilbert space; Maximum likelihood estimation. (Author)

DESCRIPTORS: (U) *STATISTICAL PROCESSES, COVARIANCE, ESTIMATES, HILBERT SPACE, MEAN, MAXIMUM LIKELIHOOD ESTIMATION, PARAMETERS, TIME

IDENTIFIERS: (U) *Gaussian processes, *Sieves, PE61102F, WUAFOSR2304A5

AD A166 055

AD-A166 040 20/12

XEROX PALO ALTO RESEARCH CENTER CA

(U) Proceedings of the International Conference on the Physics of Semiconductors (17th) Held in San Francisco, California on 6-10 August 1984.

DESCRIPTIVE NOTE: Final rept.,

AUG 84 1616P

PERSONAL AUTHORS: Chadi, James D. ;Harrison, Walter A. ;

CONTRACT NO. AFOSR-MIPR-84-00018

MONITOR: AFOSR
TR-86-0121

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Contents: Scanning Tunneling Microscopy, Chemisorption at Surfaces; Metal Semiconductor Interfaces; Semiconductor Junctions; Insulator Semiconductor Interfaces; Quantum Wells; Quantum Hall Effect; Transport in Two Dimensional Electron System; Excitons; Superlattices; Magneto-optics, Photoluminescence; Raman Scattering; Impurity Conduction; Silicon; Gallium Arsenides; Gallium Phosphides; Amorphous and Noncrystalline Semiconductors; Phonons; Phase Transitions; Band Gap Theory; Electronic States; Photoemission Studies; Excitations; Raman Scattering; Polaritons; Electron Hole Liquids; Narrow Gap Semiconductors; Semimagnetic Semiconductors; Laser Annealing; and Ion Implantation.

DESCRIPTORS: (U) *SEMICONDUCTOR DEVICES, *SEMICONDUCTORS, ELECTRON GAS, ELECTRON MICROSCOPY, TUNNELING(ELECTRONICS), ELECTRONIC SCANNERS, MAGNETIC MATERIALS, MAGNETOOPTICS, TRANSPORT PROPERTIES, CHEMISORPTION, SURFACES, EXCITONS, GALLIUM PHOSPHIDES, SYMPOSIA, ANNEALING, LASER APPLICATIONS, NARROW GAP SEMICONDUCTORS, PHONONS, PHYSICS, ELECTRONIC STATES, GALLIUM ARSENIDES, CONDUCTIVITY, IMPURITIES, ION IMPLANTATION, METALS, PHASE TRANSFORMATIONS, PHOTOELECTRIC EMISSION, HALL EFFECT, QUANTUM THEORY, QUANTUM ELECTRONICS, TWO DIMENSIONAL, LIGHT SCATTERING, RAMAN SPECTRA, SEMICONDUCTOR JUNCTIONS, SILICON

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AD-A166 040 CONTINUED

AD-A166 003 6/16

IDENTIFIERS: (U) Polaritons, Superlattices, PE61102F

MEDICAL UNIV OF SOUTH CAROLINA CHARLESTON

(U) Regulation & Development of Membrane Transport Processes.

DESCRIPTIVE NOTE: Interim rept. 15 Jul 83-14 Jun 84.

MAY 85 297P

PERSONAL AUTHORS: Graves, James S. ;

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-86-0142

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Society of General Physiologists series, Volume 39.

ABSTRACT: (U) This state-of-the-art assessment describes the means by which cell membrane transport systems are regulated in both epithelial and nonepithelial cells. Regulation and Development of Membrane Transport Processes leads readers from a physiological description of regulation toward a more mechanistic level of understanding. Distinguished researchers in physiology, biochemistry, genetics, and pharmacology offer key insights into the regulatory processes evoked by external stimuli, such as hormones or substrate limitation, and by the internal stimulus of genetically programmed development. Their multidisciplinary efforts define three forms of regulations: (1) gene expression leading to de novo synthesis; (2) insertion and removal of cytoplasmic membrane vesicles; and (3) in situ modification of the transport system in the membrane. Regulation and Development of Membrane Transport Processes reviews a wide spectrum of transport regulatory phenomena in eukaryotic cells and provides the groundwork for future research.

DESCRIPTORS: (U) *TRANSPORT PROPERTIES, *CELLS(BIOLOGY), *MEMBRANES(BIOLOGY), BIOCHEMISTRY, EXTERNAL, STIMULI, HORMONES, PHYSIOLOGY, STATE OF THE ART, TEST AND EVALUATION, SYNTHESIS, GENETICS, INTERNAL, PHARMACOLOGY.

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AD A166 003 CONTINUED

AD-A165 970 9/2 12/1

LIMITATIONS, SUBSTRATES, EPITHELIUM, SYMPOSIA, MEMBRANES,
TRANSPORT, SPECTRA

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

IDENTIFIERS: (U) PEG 102F

(U) Calculation and Use of an Environment's Characteristic
Software Metric Set.

85 8P

PERSONAL AUTHORS: Basili, Victor R.; Selby, Richard W., Jr.

CONTRACT NO. F49620-85-K-0008

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-0019

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Proceedings,
International Conference on Software Engineering, n8 p386-
391, 28-30 Aug 85.

ABSTRACT: (U) Since both cost/quality goals and
production environments differ, this reprint presents an
approach for customizing a characteristic set of software
metrics to an environment. The approach is applied in the
Software Engineering Laboratory (SEL), a NASA Goddard
production environment, to 49 candidate process and
product metrics of 652 modules from six (51,000 - 112,000
line) projects. For this particular environment, the
method yielded the characteristic metric set (source
lines, fault correction effort per executable statement,
design effort, code effort, number of I/O parameters,
number of versions). The uses examined for a
characteristic metric set include forecasting the effort
for development, modification, and fault correction of
modules based on historical data. (Author)

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *METRIC SYSTEM,
COSTS, QUALITY, PARAMETERS, ENVIRONMENTS, PRODUCTION,
CORRECTIONS, FAULTS, LABORATORIES, SYSTEMS ENGINEERING,
CODING, INPUT OUTPUT PROCESSING, FORECASTING, REPRINTS

IDENTIFIERS: (U) WUAFOSR2304A2, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 853 20/4 12/1
CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Annual Progress Report for Grant AFOSR-84-0137. 1 June 1984-31 May 1985.

NOV 85 6P

PERSONAL AUTHORS: Nicolaidis, ;

CONTRACT NO. AFOSR-84-0137

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-0001

UNCLASSIFIED REPORT

ABSTRACT: (U) The use of certain nonconforming schemes for solving viscous incompressible flow problems was put on a rigorous foundation, and the resulting theory was used to construct new convergent schemes. The investigator was able to show that a certain nonconforming quadratic element actually has the same accuracy as a well known nonconforming cubic. This is of great practical significance because the costs of implementing the quadratic elements are far less than those for cubics. Keywords: Viscous incompressible flow problems; Convergent schemes; Nonconforming quadratics.

DESCRIPTORS: (U) *INCOMPRESSIBLE FLOW, *VISCOUS FLOW, ACCURACY, CONVERGENCE, COSTS, QUADRATIC EQUATIONS, PROBLEM SOLVING, NUMERICAL METHODS AND PROCEDURES

IDENTIFIERS (U) Nonconforming quadratics. PE61102F, WUAFOSR2304A3

AD-A164 686 9/4

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Detection of Signals by Information Theoretic Criteria.

DESCRIPTIVE NOTE: Journal article 1984-1985.

APR 85 7P

PERSONAL AUTHORS: Wax, Matt ; Kailath, Thomas ;

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

MONITOR: ARO, AFOSR
19876.44-MA, TR-86-0270

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Acoustics, Speech and Signal Processing, vASSP-33 n2 p387-392 Apr 85.

ABSTRACT: (U) A new approach is presented to the problem of detecting the number of signals in a multichannel time-series, based on the application of the information theoretic criteria for model selection introduced by Akaike (AIC) and by Schwartz and Rissanen (MDL). Unlike the conventional hypothesis testing based approach, the new approach does not require any subjective threshold settings; the number of signals is obtained merely by minimizing the AIC or the MDL criteria. Simulation results that illustrate the performance of the new method for the detection of the number of signals received by a sensor array are presented. Keywords: Signal processing; Information theoretic criteria; Multichannel time series; Eigenvalues; Likelihood ratio; Sensor array processing. (Reprints)

DESCRIPTORS: (U) *DETECTION, *MULTICHANNEL, *SIGNAL PROCESSING, ARRAYS, DATA PROCESSING, DETECTORS, EIGENVALUES, INFORMATION THEORY, MODELS, REPRINTS, SELECTION, SIGNALS, SIMULATION, THEORY, TIME SERIES ANALYSIS

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AD-A164 626 9/3 12/1

AD-A164 587 11/6

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

LEHIGH UNIV BETHLEHEM PA DEPT OF METALLURGY AND MATERIALS ENGINEERING

(U) Explicit Strict Sense State-Space Realizations of Non-Stationary Processes.

(U) Crack Propagation in Powder Metallurgy Hot Isostatically Pressed Nickel-Based Alloy.

DESCRIPTIVE NOTE: Journal article 1984-1985.

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

85 19P

MAY 85 28P

PERSONAL AUTHORS: Kallath, Thomas ; Ljung, Lennart ;

PERSONAL AUTHORS: Hertzberg, Richard W. ;

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

CONTRACT NO. AFOSR-83-0029

MONITOR: ARD, AFOSR
19876.46-MA, TR-86-0263

PROJECT NO. 2306

UNCLASSIFIED REPORT

TASK NO. A1

MONITOR: AFOSR
TR-85-0672

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Control, v42 n5 p971-988 1985.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Supersedes AD-A158 885.

ABSTRACT: (U) This reprint addresses the following problem: Given a possibly non-stationary second-order or Gaussian stochastic process over a certain time interval, find all state-space realizations that produce the given process as their output. A constructive solution to this problem is described. In particular, the degrees of freedom left in this problem are explicitly displayed in terms of additional random variables and processes injected into the state-space description. Special attention is paid to output-induced, or internal, state-space realizations, that is, those for which the state vector is completely determined by the given process. The development is self-contained, the approach and proofs are fairly elementary, and explicit formulas are given for the various realizations. Keywords: White noise; Covariance functions; Electrical engineering. (Author)

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 and display a dependence on grain size with larger grain sizes giving higher 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. Keywords: Fatigue crack

DESCRIPTORS: (U) *ELECTRICAL ENGINEERING, *STOCHASTIC PROCESSES, COVARIANCE, DEGREES OF FREEDOM, FUNCTIONS, RANDOM VARIABLES, REPRINTS, TIME INTERVALS, WHITE NOISE, GAUSSIAN QUADRATURE

IDENTIFIERS: (U) *Nonstationary processes

AD A164 626

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AD-A164 587 CONTINUED

propagation, nickel-based superalloys, powder metallurgy, crack length influence.

DESCRIPTORS: (U) *CRACK PROPAGATION, *NICKEL ALLOYS, *SUPERALLOYS, CRACKS, CYCLES, FATIGUE(MECHANICS), FORCE(MECHANICS), GRAIN SIZE, HEAT TREATMENT, LENGTH, LOADS(FORCES), LOW INTENSITY, MICROSTRUCTURE, PARTICLES, POWDER METALLURGY, RATES, RESPONSE, STRESS CONCENTRATION, STRESSES, THRESHOLD EFFECTS, VALUE, ISOSTATIC PRESSING

IDENTIFIERS: (U) PE61102F, WUAF05R2306A1

AD-A164 586 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Computation of the Stationary Values of the Product of Two Raleigh Quotients.

DESCRIPTIVE NOTE: Technical memo.

SEP 85 16P

PERSONAL AUTHORS: Rao, C. R. ; Rao, C. V. ;

REPORT NO. TR-85-34

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR
TR-86-0038

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational algorithm is developed for finding the stationary values of the function $x'Cx/\sqrt{x'Ax}\sqrt{x'Bx}$ where A and B are positive definite and C is a symmetric matrix. The square of the function under consideration is the product of two Raleigh coefficients $x'Cx/x'Ax$ and $x'Cx/x'Bx$. The general problem occurs in multivariate analysis in the computation of homologous canonical variates in studying relationships between two sets of homologous measurements. The special case with $C=I$ occurs in designing control systems with minimum norm feedback matrices. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, ALGORITHMS, MULTIVARIATE ANALYSIS, SQUARE ROOTS, CONTROL SYSTEMS, STATIONARY, VALUE, FUNCTIONS(MATHEMATICS), COEFFICIENTS

IDENTIFIERS: (U) Rayleigh quotients, PE61102F, WUAF05R2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Effects of Assuming Independent Component Failure Times, if They Are Actually Dependent, in a Series System

DESCRIPTORS: (U) SERIES(MATHEMATICS), COMPUTERIZED SIMULATION, DISTRIBUTION, ESTIMATES, FAILURE, GRAPHICS, LIFE TESTS, MATHEMATICAL ANALYSIS, MATHEMATICAL MODELS, MULTIVARIATE ANALYSIS, PARAMETERS, QUADRANTS, REGRESSION ANALYSIS, RELIABILITY

DESCRIPTIVE NOTE: Annual rept. 1 Oct 84-31 Oct 85.

IDENTIFIERS: (U) Robustness, LPN-OSURF-7632651714837, PEG1102F, WUAFOSR2304A5

DEC 85 133P

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

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-1215

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this proposal is to investigate the robustness to departures from independence of methods currently in use in reliability studies when competing failure modes or competing causes of failure associated with a single mode are present in a series system. The first specific aim is to examine the error one makes in modeling a series system by a model which assumes statistically independent component lifetimes when in fact the component lifetimes follow some multivariate distribution. The second specific aim is to assess the effects of the independence assumption on the error in estimating component parameters from life tests on series systems. In both cases, estimates of such errors will be determined via mathematical analysis and computer simulations for several prominent multivariate distributions. A graphical display of the errors for representative distributions will be made available to researchers who wish to assess the possible erroneous assumption of independent competing risks. A third aim is to tighten the bounds on estimates of component reliability when the risks belong to a general dependence class of distributions (for example, positive quadrant dependence, positive regression dependence, etc.).
Keywords: Series(Mathematics); and Mathematical models.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK55I

AD A164 415 7/4

SAN DIEGO STATE UNIV CA DEPT OF CHEMISTRY

(U) Mechanism of the Silane Decomposition. I. Silane Loss Kinetics and Rate Inhibition by Hydrogen. II. Modeling of the Silane Decomposition (All Stages of Reaction).

85 41P

PERSONAL AUTHORS: White, R. T. ; Espino-Rios, R. L. ; Rogers, D. S. ; Ring, M. A. ; O'Neal, H. E. ;

CONTRACT NO. AFOSR-83-0209

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-1251

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Chemical Kinetics, v17 p1029-1055 1985

ABSTRACT: (U) Kinetic data for the static system silane pyrolysis (from 640-703 K, 60-400 torr) are presented. For conversion from 3-30%, first-order kinetics are obtained, with silane loss rates equal to half the hydrogen formation rates. At conversions greater than 40%, rate inhibition attributable to the back reaction of hydrogen with silylene occurs. Overall reaction rates are not surface sensitive, but disilane and trisilane yield maxima under some conditions are. A nonchain mechanism capable of describing quantitatively all stages of the silane pyrolysis is proposed. Post 1.0% initiation is both homogeneous (gas phase) and heterogeneous (on the walls), and reaction intermediates are silylenes and disilenes. An analysis is made of each rate constant of the silane mechanism and the modeling results are compared with experimental results. Agreement is excellent. It is concluded that the dominant sink reaction for silylene intermediates is 1,2-H₂ elimination from disilane (followed by Si₂H₄ polymerization and wall deposition). The model is in accord with slow isomerization between disilene and silylsilylene and near exclusive 1,2 H₂ elimination from Si₂H₆. It is also concluded that disilene is about 10 kcal/mole more stable

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than silylsilylene and that the activation energy for isomerization of silylsilylene to disilene is greater than 26 kcal/mole

DESCRIPTORS: (U) HYDROGEN, SILANES, REACTION KINETICS, PYROLYSIS, ACTIVATION ENERGY, CONSTANTS, DECOMPOSITION, DEPOSITION, INHIBITION, ISOMERIZATION, KINETICS, LOSSES, RATES, REACTION TIME, STATICS, VAPOR PHASES, WALLS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

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AD-A164 401 11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Molecular Aspects of Rubberlike Elasticity.

OCT 85 GP

PERSONAL AUTHORS: Mark, James E. ;

CONTRACT NO AFOSR-83-0027

PROJECT NO 2303

TASK NO A3

MONITOR: AFOSR
TR 85-1208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Accounts of Chemical Research,
v18 p202-206 1985

ABSTRACT: (U) Rubberlike elasticity is reviewed with regard to molecular theories, bimodal networks, non-Gaussian theory, interpenetrating networks, dangling chain networks, sorption and extraction of diluents, and elastomers filled in situ. Keywords: reprints; filled elastomers; silica fillers. (Author)

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *ELASTOMERS, *MOLECULAR PROPERTIES, DILUENTS, DUAL MODE, EXTRACTION, FILLERS, FILLING, MOLECULES, NETWORKS, REPRINTS, SILICON DIOXIDE, SORPTION, SYNTHETIC RUBBER, THEORY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

AD A164 401

AD A164 388 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Sequential Excitation Preparation of Molecular Energy Levels with Special Structural and Chemical Properties

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

JAN 86 16P

PERSONAL AUTHORS: Field, Robert W. ; Kinsey, James L. ;

CONTRACT NO. F49620-85-C-0006

PROJECT NO 2303

TASK NO 81

MONITOR: AFOSR
TP 85-0022

UNCLASSIFIED REPORT

ABSTRACT: (U) Stimulated Emission Pumping Studies of Formaldehyde-Our SEP studies of H₂CO are essentially complete. They have yielded an unprecedentedly complete set of anharmonic constants for a 4-atom molecule. SEP studies of D₂CO have begun, but the spectra appear much more complex and congested. Quantum Ergodicity in H₂CO-The non-rotating levels are well organized and unambiguously assignable as normal mode combination and overtone vibrational states. By J approx 10, Ka approx 2 the rotation-vibration levels are intrinsically unassignable, but the spectral density of states is not equal to the total density of states. The spectroscopic distinction between organized and disorganized states is not reflected by any so-far measurable difference in the collisional depopulation rates for organized vs. disorganized levels. Collisional Studies in H₂CO-Several new techniques have been demonstrated on H₂CO/H₂CO and H₂CO/He or Ar rotational energy transfer (RET). Transient Gain Spectroscopy (TGS) and Transient Polarization Spectroscopy (TPS) have been applied to the H₂CO A 1A₂ state. RET follows dipole propensity rules and the rate of elastic reorientation is found to be negligible relative to the total of inelastic rates. Transient Absorption Polarization Spectroscopy (TAPS) has been applied to highly excited (11,400/cm) vibrational levels of the H₂CO X 1A₁ state.

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AD-A164 387 7/4 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

DESCRIPTORS: (U) *FORMALDEHYDE, *MOLECULAR ENERGY LEVELS, *SPECTROSCOPY, ABSORPTION SPECTRA, CHEMICAL PROPERTIES, COLLISIONS, CONSTANTS, ELASTIC PROPERTIES, EMISSION, ENERGY TRANSFER, ERGODIC PROCESSES, EXCITATION, GAIN, POLARIZATION, PREPARATION, PUMPING, QUANTUM THEORY, RATES, ROTATION, SEQUENCES, STIMULATION(GENERAL), STRUCTURAL PROPERTIES, TRANSIENTS, VIBRATION, MOLECULAR VIBRATION, MOLECULAR ROTATION, RESONANCE, MOLECULAR PROPERTIES, DIPOLE MOMENTS, PERTURBATIONS

(U) Time-Resolved Flash Spectroscopic Investigations of the Reactions of Singlet Arylhalocarbenes.

85 15P

PERSONAL AUTHORS: Gould, I. R.; Turro, N. J.; Butcher, J., Jr.; Doubleday, C., Jr.; Hacker, N. P.;

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-1005

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron, v41 n8 p1587-1600 1985.

ABSTRACT: (U) The results of time-resolved laser flash spectrometric studies of singlet arylhalocarbenes are reviewed. In particular, the absolute rate constants for reactions of phenylchlorocarbene and related carbenes with alkenes are summarized and systematized. The experiments described provide the basis for a detailed examination of carbenic reactivity-sensitivity principles. The results of studies on the influence of temperature on the absolute rate constants for carbene reactions are consistent with the existence of transient carbene/alkene intermediates. Keywords: Pulsed laser photolysis.

DESCRIPTORS: (U) *ALKENES, *CARBENES, *PHOTOLYSIS, *PHOTOLYSIS, *REACTION KINETICS, *SPECTROSCOPY, REPRINTS, PULSED LASERS, RATES, TIME, TRANSIENTS, CONSTANTS, FLASHES, PHENYL RADICALS, CHLORINE COMPOUNDS

IDENTIFIERS: (U) Singlet states, PE61102F, WUAFOSR2303B2

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AD-A164 374 20/6

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) Nonlinear Nonreciprocity: Theory and Applications to the Enhancement of the Sagnac Effect, Optical Bistability.

DESCRIPTIVE NOTE: Final rept. 1 Sep-31 Oct 84.

NOV 85 84P

PERSONAL AUTHORS: Kaplan, A. E. ;

CONTRACT NO. AFOSR-83-0343

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR
TR-85-1205

UNCLASSIFIED REPORT

ABSTRACT: (U) Several novel implementations of optical bistability have been proposed and analyzed. Novel applications of optical nonlinearities in a ring have been proposed; particularly interesting is the use of nonlinear nonreciprocity of counterpropagating waves in a ring to enhance the Sagnac Effect, and, thereby, increase the sensitivity of a passive ring optical gyro. The use of moderate energy electron beams traversing superlattices to generate coherent x-rays by the coherent addition of transition radiation has also been proposed and analyzed. This document is a collection of articles pertaining to such fields as: Solitons; Cyclotron resonance of free electrons; High energy electron beams. (Author)

DESCRIPTORS: (U) *GYROSCOPES, *OPTICAL EQUIPMENT, *BISTABLE DEVICES, CYCLOTRON RESONANCE, FREE ELECTRONS, HIGH ENERGY, NONLINEAR SYSTEMS, OPTIMIZATION, PASSIVE SYSTEMS, PROPAGATION, RADIATION, RINGS, TRANSITIONS, X RAYS, ELECTRON BEAMS

IDENTIFIERS: (U) *Sagnac effect, Optical bistability, Solitons, Optical gyroscopes, PE61102F, WUAFOSR2305B2

AD-A164 374

AD-A164 328 6/5 6/1

OHIO STATE UNIV COLUMBUS DEPT OF PHYSIOLOGICAL CHEMISTRY

(U) Hematopoiesis and the Inosine Modification in Transfer RNA.

85 8P

PERSONAL AUTHORS: Trewyn, Ronald W. ; Kretz, Keith A. ; Utz, Eric D. ; Patrick, Dawn E. ; Muralidhar, Girija ;

CONTRACT NO. AFOSR-80-0283

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-85-1217

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Society for Experimental Biology and Medicine v179 p497-503 1985.

ABSTRACT: (U) Human promyelocytic leukemia (HL-60) cells were used to begin to evaluate the role in hematopoiesis of inosine biosynthesis in the tRNA anticodon wobble position; a reaction involving the enzymatic insertion of preformed hypoxanthine. Dimethyl sulfoxide (DMSO) and hypoxanthine were found to induce the differentiation of HL-60 cells in a synergistic manner, and the induced differentiation was independent of changes in the purine catabolic enzymes adenosine deaminase and purine nucleoside phosphorylase. The short-term exposure of HL-60 cells to DMSO plus hypoxanthine resulted in enhanced leucine incorporation, and a model is presented showing how the inosine modification reaction in tRNA may be involved. A means by which hypoxanthine insertion into tRNA may modulate the synthesis of regulatory proteins (g., lymphokines and cell surface receptors) is also outlined.

DESCRIPTORS: (U) *BIOSYNTHESIS, *HEMATOPOIESIS, *INOSIN, *RIBONUCLEIC ACIDS, *MONOCYTES, *LEUKEMIA, METHYL SULFOXIDE, INOSINE, MODIFICATION, LEUCINE, ADENINE, HYDROLYSIS, MODIFICATION, LYMPHOCYTES, NUCLEOSIDES, PHOSPHORYLASES, PURINE ALKALOIDS, ATTENUATION, REPRINTS

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IDENTIFIERS: (U) Hypoxanthines, Deaminases, PE61102F,
WUAFOSR2312A5

CALIFORNIA UNIV SANTA BARBARA ALGEBRA INST

(U) Ryser's Permanent Identity in the Symmetric Algebra.

85 15P

PERSONAL AUTHORS: Marcus, Marvin ; Sandy, Markus ;

CONTRACT NO. AFOSR-83-0150

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-0025

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear and Multilinear
Algebra, v18 p183-196 1985.

ABSTRACT: (U) The polynomial algebra over a field is
canonically isomorphic to the symmetric algebra over a
vector space. Several identities expressing homogeneous
polynomials in terms of sums of powers of linear
polynomials are exploited to obtain Ryser's permanent
identity along with extensions of some recent identities
due to Bebian. Keywords: Reprints; Multilinear algebra.
(Author)

DESCRIPTORS: (U) *POLYNOMIALS, *LINEAR ALGEBRA,
HOMOGENEITY, REPRINTS, SYMMETRY, VECTOR SPACES

IDENTIFIERS: (U) Rysers permanent identity, Multilinear
algebra, PE61102F, AFOSR2304A2

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AD-A164 315 4/1

SRI INTERNATIONAL MENLO PARK CA

(U) Observations of Gravity Waves in the Auroral Zone,

DEC 83 8P

PERSONAL AUTHORS: Bertin, F. ; Kofman, W. ; Lejeune, G. ;

CONTRACT NO. F49620-83-K-0005

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-85-1247

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Radio Science, v18 n6 p1059-1065 Nov-Dec 83.

ABSTRACT: (U) The electron density, ion temperature, and velocity measured on November 18, 1981, from 1100 to 1700 UT by EISCAT facilities exhibited clearly periodic behavior. We present an attempt to interpret this feature as a manifestation of gravity waves. November 18 was a day of high magnetic activity, and it was difficult to separate completely the local effects from those induced by the gravity waves. The observed waves had a period of about 75-80 min and vertical wavelength of the order of 800 km. They were possibly generated in the auroral oval, about 1000 km from Tromsø. Keywords: Incoherent scatter; Ionosphere; Thermosphere; Electron density; Gravity waves; Auroral zone.

DESCRIPTORS: (U) *AURORAE, *THERMOSPHERE, *GRAVITY WAVES, ELECTRON DENSITY, GRAVITY, INCOHERENT SCATTERING, IONOSPHERE, IONS, MAGNETIC FIELDS, OBSERVATION, TEMPERATURE, VERTICAL ORIENTATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2

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ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Optimum/Near-Optimum Incentive Policies for Stochastic Decision Problems Involving Parametric Uncertainty,

85 11P

PERSONAL AUTHORS: Cansever, Derya H. ; Basar, Tamer ;

CONTRACT NO. N00014-84-K-0469, AFOSR-84-0056

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-86-0002

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v21 n5 p575-584 1985.

ABSTRACT: (U) In this paper we consider a general class of stochastic incentive decision problems in which the leader has access to the control value of the follower and to private as well as common information of the unknown state of nature. The follower's cost function depends on a finite number of parameters whose values are not known accurately by the leader, and in spite of this parametric uncertainty the leader seeks a policy which would induce the desired behavior on the follower. We obtain such policies for the leader, which are smooth, induce the desired behavior at the nominal values of these parameters, and furthermore make the follower's optimal reaction either minimally sensitive or totally insensitive to variations in the values of these parameters from the nominals. The general solution is determined by some orthogonality relations in some appropriately constructed (probability) measure spaces, and leads to particularly simple incentive policies. The features presented here are intrinsic to stochastic decision problems and have no counterparts in deterministic incentive problems. Keywords: Stochastic systems; Economic systems; Team theory; Decision theory; Game theory; Optimization; Stackelberg games

DESCRIPTORS: (U) *DECISION MAKING, *PARAMETRIC ANALYSIS,

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DECISION THEORY, DETERMINANTS(MATHEMATICS), ECONOMICS,
GAME THEORY, OPTIMIZATION, PARAMETERS, POLICIES,
STOCHASTIC PROCESSES, TEAMS(PERSONNEL), ORTHOGONALITY,
REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6

AD-A164 287 12/1

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL
SCIENCES

(U) State Estimation for Cox Processes with Unknown
Probability Law.

85 18P

PERSONAL AUTHORS: Karr, Alan F. ;

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0021

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic Processes and
Their Applications, v20 p115-131 1985.

ABSTRACT: (U) This reprint describes techniques
developed for approximation of state estimators using
data from the processes $N_{sub 1}, \dots, N_{sub n}$ to estimate
necessary attributes of the unknown probability law of
the time $M_{sub i}$. The techniques are based on
representation of the state estimators in terms of
reduced Palm distributions of the $N_{sub i}$ and on
estimation of these Palm distributions. Estimators of
Palm distributions are shown to be strongly consistent
and asymptotically normal.

DESCRIPTORS: (U) *ESTIMATES, PROBABILITY, REPRINTS, TIME,
APPROXIMATION(MATHEMATICS), DISTRIBUTION FUNCTIONS,
ASYMPTOTIC NORMALITY

IDENTIFIERS: (U) Cox processes, Palm distributions,
PE61102F, WUAFOSR2304A5

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AD-A164 278 CONTINUED

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Analysis of the Electromagnetic Signals of the Human Brain: Milestones, Obstacles, and Goals.

DEC 84 20P

PERSONAL AUTHORS: Gevins, Alan S. ;

CONTRACT NO F49620-84-K-0008

PROJECT NO 2313

TASK NO. A4

MONITOR AFOSR
TR-85-1212

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Biomedical Engineering, vME-31 n12 p833-850 Dec 84.

ABSTRACT: (U) Measuring the functioning of the human brain is one of the most formidable scientific/engineering endeavors ever undertaken. It is difficult to extract information about any particular processing function from brain electromagnetic signals (BEMS) since, at any instant, only a small fraction of the brain's hundreds of simultaneously active major system might be performing processing related to the function being studied. With recent developments, a new era of research is dawning based on an interdisciplinary approach in which advanced signal processing methods are focused on increasingly more specific neuroanatomical, neurophysiological, and neuropsychological research questions and clinical applications. This brief review highlights the major accomplishments of the last several decades in human BEMS analysis and discusses obstacles to progress. Five main topics are addressed: (1) the historical problem of developing a computerized expert clinical electroencephalogram (EEG) system; (2) advances in signal processing methods, including primary analysis, feature extraction, and statistical hypothesis testing and pattern classification; (3) integrated computing systems for BEMS analysis; (4) biophysical, basic science, practical and conceptual obstacles to progress; and (5) the long term goal of developing a device for measuring

the functional integrity of major neural systems, and the related topic of neurocybernetics. Cutting-edge issues discussed include: measurement and modeling of nonstationary event-related signals, characterization of spatial processes, single-trial signal detection, location of the sources of scalp-recorded field distributions, and studies of the functional significance of BEMS.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *BRAIN, *ELECTROENCEPHALOGRAPHY, BARRIERS, BIOPHYSICS, CLASSIFICATION, CLINICAL MEDICINE, COMPUTER APPLICATIONS, ELECTROMAGNETIC RADIATION, ENGINEERING, HUMANS, HYPOTHESES, INTEGRATED SYSTEMS, METHODOLOGY, NERVOUS SYSTEM, NEUROLOGY, PATTERNS, PROCESSING, PSYCHOLOGY, SIGNALS, SPATIAL DISTRIBUTION, STATISTICAL TESTS, ELECTROMAGNETIC WAVE PROPAGATION, NEUROPHYSIOLOGY, COGNITION, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 277 8/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Passive Resonator Gyroscope.

DESCRIPTIVE NOTE: Progress rept. Jan-Dec 84.

JAN 85 4P

PERSONAL AUTHORS: Zarinetchi, Farhad ; Ezekiel, Shaoul ; Shu, Robert ; Kierstead, John ;

CONTRACT NO. F49620-82-C-0091

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-0031

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in RLE Progress report no. 127, p125-126, Jan 85.

ABSTRACT: (U) Precision measurement of inertial rotation is of much interest in a number of areas, such as navigation, geophysics, and relativity. The geophysical applications include the measurement of the various effects that cause fluctuations in the earth's rotation rate Ω_{Earth} , ranging from 10 to the minus 7th power to 10 to the minus 9th power Ω_{Earth} , for example, nutation, precession, wobble, and tidal-friction effects. The relativistic effects range in sensitivity from 10 to the minus 9th power to 10 to the minus 11th power Ω_{Earth} and include measurements of the preferred frame and the drag parameters. The advent of the laser in 1960 rekindled the interest in the use of the Sagnac effect for sensing inertial rotation by optical means. Several approaches of implementing the Sagnac effect have been under investigation. These include active techniques, such as the ring laser gyro, and passive techniques employing passive ring resonators or multiturn fiber-optic interferometers. In all these approaches, the measurement sensitivity scales with the area enclosed by the light path. Typically, to reach the sensitivity needed to measure the geophysical and relativistic

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effects mentioned previously, it is necessary to consider areas between 100 and 10,000 sq m. Our research effort at present centers around a passive 10 cm square resonator with a finesse of 12000 (kindly made available to us by Litton). The differences between the resonance frequencies of the cavity for clockwise and counterclockwise propagation that is induced by inertial rotation is measured by a low power He-Ne laser mounted external to the cavity.

DESCRIPTORS: (U) *ROTATION, *GYROSCOPES, DRAG, FIBER OPTICS, GEOPHYSICS, HELIUM NEON LASERS, INTERFEROMETERS, LASERS, LIGHT, LOW POWER, MEASUREMENT, PARAMETERS, PASSIVE SYSTEMS, PATHS, PRECESSION, PROPAGATION, REPRINTS, RESONANT FREQUENCY, RESONATORS, RING LASERS, RINGS, SCALE, SENSITIVITY

IDENTIFIERS: (U) Earth rotation, *Passive resonator gyroscopes, PE61102F, WUAFOSR2301A1

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ULTRASYSTEMS INC IRVINE CA

develop materials which would act as oxidation and corrosion inhibitors in addition to serving as lubricity additives.

(U) Phospha-S-Triazines. X. Thiophenyl-Substituted Phospha-S-Triazines.

85 18P

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *TRIAZINES, *PHOSPHORUS COMPOUNDS, *LUBRICANT ADDITIVES, ADDITIVES, ALLOYS, CORROSION INHIBITION, FAILURE, FLUIDS, HIGH TEMPERATURE, MASS SPECTRA, METAL COMPOUNDS, METALS, NITROGEN, OXIDATION, PATTERNS, PHYSICAL PROPERTIES, PHENYL RADICALS, ANTIOXIDANTS, REPRINTS

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

IDENTIFIERS: (U) Perfluoroalkylethers, PE61102F, WUAFOSR2303B2

CONTRACT NO. F49620-82-C-0021, F49620-79-C-0037

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-1209

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v29 p399-415 1985. See also 9, AD-A160 485.

ABSTRACT: (U) A series of thiophenyl-substituted mono- and diphospha-s-triazines was prepared. These materials exhibited physical characteristics similar to those of the corresponding phenyl analogues, but the mass spectral breakdown patterns were dominated by the loss of the thiophenyl group and differed significantly from that of the other phospha-s-triazines investigated to date. The thiophenyl-phospha-s-triazines exhibited anticorrosive and antioxidative action when used as additives in perfluoroalkylether fluids. At elevated temperatures, 316 C, these materials were less effective than the phenyl analogues. The monophospha members of the series were thermally and oxidatively less stable than the corresponding diphospha-s-triazines: 67 versus 96% starting material recovery after exposure to air at 235 C for 24 hr. Both the mono- and diphospha-s-triazines were completely degraded in 24 hr at 316 C in nitrogen. Past investigations have shown phospha-s-triazines, as well as the diphosphate-tetraazacyclooctatetraenes to exhibit anticorrosion and antioxidative action when used in perfluoroalkylether fluids in the presence of metals or metal alloys. This particular phase of the research was directed at synthesis and evaluation of thiophenyl substituted phospha-s-triazines with the ultimate aim to

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EEG SYSTEMS LAB SAN FRANCISCO CA

PARALLEL PROCESSING, HEMISPHERES, REPRINTS

(U) Neurocognitive Pattern Analysis of a Visuospatial Task.
Rapidly-Shifting Foci of Evoked Correlations between
Electrodes.

IDENTIFIERS: (U) Evoked potentials, PE61102F,
WUAFOSR2313A4

JAN 85 14P

PERSONAL AUTHORS: Gevins, Alan S. ; Doyle, Joseph C. ;
Cuttillo, Brian A. ; Schaffer, Robert E. ; Tannehill, Robert S.

CONTRACT NO. F49620-84-K-0008

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-1194

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Psychophysiology, v22 n1 p32-
43 Jan 85.

ABSTRACT: (U) Spatial patterns of correlation between
pairs of electrodes in 15 channels of human scalp-
recorded brain potentials were determined by applying
Neurocognitive Pattern (NCP) Analysis to single-trial EEG
data from 9 adults performing a visuospatial task.
Spatial patterns of difference in inter-electrode
correlation between 'move' and 'no-move' trials of the
task increased in magnitude through four successive 175-
ms wide analysis intervals. Results are consistent with a
distributed network model of neurocognitive function
where parallel activity in many neural areas is
integrated in a rapidly shifting pattern of focal
activity. Keywords: Visuospatial, Single-trial analysis,
Correlation, Evoked potentials, Mathematical pattern
recognition, Neurocognitive, Parallel processing, Spatial
localization, and Hemispheric lateralization.

DESCRIPTORS: (U) *ELECTROENCEPHALOGRAPHY, *VISION,
*MOTOR REACTIONS, *COGNITION, MATHEMATICS, MODELS,
NERVOUS SYSTEM, NETWORKS, CORRELATION, ELECTRODES,
PATTERN RECOGNITION, PATTERNS, SHIFTING, SPATIAL
DISTRIBUTION, DISTRIBUTION, INTERACTIONS, NEUROPHYSIOLOGY.

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FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

LIMITATIONS, LINEARITY, NITROGEN LASERS, NUCLEAR
RADIATION, SPECTROMETRY

(U) Laser Excited Atomic Fluorescence of Some Precious
Metals in the Air/Acetylene Flame.

IDENTIFIERS: (U) Laser Atomic Fluorescence Spectrometry.
PE61102F, WUAFOSR2303A1

85 6P

PERSONAL AUTHORS: Kachin, S. V. ; Smith, B. W. ; Winefordner,
J. D. ;

CONTRACT NO. F49620-84-C-0002

PROJECT NO 2303

TASK NO. A1

MONITOR: AFOSR
TR- 5-1244

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Spectroscopy, v39 n4
p587-590 1985.

ABSTRACT: (U) A pulsed, tunable dye laser pumped with a
nitrogen laser is used to excite the atomic fluorescence
of Ru, Pd, Ir, Pt, and Au in an air/acetylene flame. The
detection limits obtained have been improved about 40 to
400 times, excepting those for Au. These elements can be
detected at the ng/mL (ppb) level or less with analytical
curve linearity of over four orders of magnitude.
Improvement of the detection limits was achieved mainly
by the use of a large-aperture detection system and a
frequency-doubled dye laser for excitation of
nonresonance atomic fluorescence. Interferences among
these five elements and also from Rh, Os, Cu, and Ni were
investigated. The detection limits obtained are superior
to flame atomic absorption spectrometry and flame atomic
emission spectrometry and comparable to or better than
the best detection limits of atomic emission inductively
coupled plasma spectrometry and dc plasma spectrometry.
Of course, the spectral selectivity greatly exceeds other
analytical atomic spectroscopic methods.

DESCRIPTORS: (U) *FLAMES, *ATOMIC SPECTROSCOPY, *LASER
APPLICATIONS, *PRECIOUS METALS, ATOMIC SPECTRA, APERTURES,
ABSORPTION, AIR, ACETYLENE, REPRINTS, CURVE FITTING,
DETECTION, DETECTORS, DYE LASERS, EMISSION SPECTRA.

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ADVANCED INFORMATION AND DECISION SYSTEMS MOUNTAIN VIEW
CA

IDENTIFIERS: (U) PRL(Program Reference Language), Ada
programming language, *Query languages, PE61102F,
WUAFDSR2304A2

(U) Formalization of the Program Reference Language.

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

OCT 85 84P

PERSONAL AUTHORS: Bricken, William M. ; Rosenbaum, Susan G. ;
Brzustowicz, Michael A. ; Dean, Jeffrey S. ; McCune, Brian P. ;

REPORT NO. AI/DS-TR-1066-01

CONTRACT NO. F49620-84-C-0075

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-1219

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the Program Reference Language (PRL) Project is to construct a representation of Ada programs that facilitates retrieval of code based on both syntactic (literal) and semantic (functional) queries. The fourth year of the project focused on the formalization of the Extended Program Model (EPM), which consists of textual, syntactic, and semantic representations. The PRL query language specifies search over these three interrelated databases. Textual items are retrieved by string-matching capabilities of standard editors; syntactic queries are directed to the syntax parse tree; queries referencing program functionality are mapped onto the LOSP semantic representation. Key words: Program Reference Language (PRL), Extended Program Model (EPM), Intelligent Program Editor (IPE), Artificial Intelligence (AI), Program editing, Ada editor, Ada syntax, Semantic model, Pictorial logic, Query language, and LOSP.

DESCRIPTORS: (U) *INTERROGATION, *HIGH LEVEL LANGUAGES, ARTIFICIAL INTELLIGENCE, CODING, DATA BASES, EDITING, INFORMATION RETRIEVAL, INTERACTIONS, SYNTAX, SEMANTICS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVK551

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SRI INTERNATIONAL MENLO PARK CA

(U) Development of an Experimental Technique and Related Analyses to Study the Dynamic Tensile Failure of Concrete.

DESCRIPTIVE NOTE: Annual rept. 1 May 82-30 Apr 85.

JUL 85 225P

PERSONAL AUTHORS: Gran, James K. ;

CONTRACT NO. F49620-82-K-0021

PROJECT NO 2302

TASK NO. C2

MONITOR: AFOSR
TR-85-1240

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elastic-fracturing (strain-softening) representation for the material. By trial and error, material parameters were chosen for each experiment so that satisfactory agreement was obtained between the calculated strains and the measured strains. Keywords: Brittle; Microcracks; Strain-rod; Strain-softening; Tension.

DESCRIPTORS: (U) *FAILURE, *TENSILE PROPERTIES, *GEOLOGY, *CONCRETE, AXES, COMPRESSION, COMPUTATIONS, DYNAMICS, FINITE DIFFERENCE THEORY, FRACTURE(MECHANICS), LENGTH, LOADS(FORCES), MATERIALS, MEASUREMENT, MICROCRACKING, NUMERICAL ANALYSIS, ONE DIMENSIONAL, PARAMETERS, PRESSURE, RODS, STATICS, STRAIN RATE, TENSILE STRENGTH, TENSILE STRESS, TRANSIENTS, TRIAXIAL STRESSES

IDENTIFIERS: (U) LPN-SRI-PYU-4451, PE61102F, WUAFOSR2302C2

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research was to develop and demonstrate experimental and analytical techniques to study the tensile failure of concrete and geologic materials at strain rates of about 10 per second. A new experimental method was developed, a set of experiments was conducted, and the experiments were interpreted with numerical calculations. In the new experiments a 5-cm-diameter rod is first loaded in static triaxial compression, then the axial pressure is released from each end simultaneously and very rapidly. The resulting relief waves interact in the center of the rod to produce a dynamic tensile stress equal in magnitude to the original static compression. Tensile failure occurs if the tensile stress exceeds the tensile strength for these conditions. The radial pressure is held approximately constant during the experiment. Several experiments of this type were performed on concrete. In every case the rod fractured near the midpoint; in some cases a second fracture also occurred several centimeters from the midpoint. Transient measurements were made of the axial load at each end, the confining pressure, and axial and circumferential surface strains at several locations along the length of the rod. Each experiment was interpreted with a set of one-dimensional finite difference calculations, using an

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NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD

(U) Thermodynamics of High Temperature Materials.

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

DEC 85 125P

PERSONAL AUTHORS: Abramowitz, Stanley ;

CONTRACT NO. AFOSR-ISSA-85-00029

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-0008

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Research on Thermophysical Properties; High Temperature Enthalpy Measurements; Broad Band Spectroscopy of Small Molecules in Intense Laser Fields; Growth and Decomposition of Graphitic Structure; Build Up and Irradiation of Obscuring Clouds Under Near Vacuum Conditions - Application to Spacecraft Survivability; and Molecular Basis for Laser Induced Vaporization of Refractory Materials. Keywords: Heat resistant materials; Photodissociation; Silicon nitrides; Vaporization; Graphite; Ceramics; Boron nitrides. (Author)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *HEAT RESISTANT MATERIALS, *THERMODYNAMICS, BORON NITRIDES, BROADBAND, CLOUDS, DECOMPOSITION, ENTHALPY, GRAPHITE, HIGH TEMPERATURE, INTENSITY, LASERS, MATERIALS, MOLECULES, PHOTODISSOCIATION, REFRACTORY MATERIALS, SILICON NITRIDES, SPACECRAFT, SPECTROSCOPY, STRUCTURAL PROPERTIES, SURVIVABILITY, THERMOPHYSICAL PROPERTIES, VACUUM, VAPORIZATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2

AD-A164 252 20/12 9/1 20/2

SPIRE CORP BEDFORD MA

(U) Epitaxial (100) GaAs Thin Films on Sapphire for Surface Acoustic Wave/Electronic Devices.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-28 May 85.

DEC 85 32P

PERSONAL AUTHORS: Haven, Victor E. , Jr;

REPORT NO. SPIRE-TR-60057

CONTRACT NO. F49620-84-C-0108

MONITOR: AFOSR
TR-86-0006

UNCLASSIFIED REPORT

ABSTRACT: (U) In the past year it has been demonstrated that undoped <111> single crystal gallium arsenide could be grown on <0112> sapphire using the metalorganic chemical vapor deposition (MOCVD) growth technique. An interesting and unexpected result from this work was that the GaAs films grown had a <111> orientation instead of the proposed <100> orientation. Keywords include: Metalorganic chemical vapor deposition, gallium arsenide, surface acoustic wave devices, and R-plane sapphire.

DESCRIPTORS: (U) *SURFACE ACOUSTIC WAVE DEVICES, *GALLIUM ARSENIDES, *THIN FILMS, *SAPPHIRE, ORGANOMETALLIC COMPOUNDS, FILMS, CHEMICAL REACTIONS, GROWTH(GENERAL), VAPOR DEPOSITION

IDENTIFIERS: (U) PE61102F

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AD-A164 250 20/5 20/7

STANFORD UNIV CALIF W W HANSEN LABS OF PHYSICS

(U) Construction of a High Energy Linear Accelerator for Research in Free Electron Lasers, Beam-Wave Interactions, Spectroscopy and Microcircuitry Fabrication.

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

DEC 85 12P

PERSONAL AUTHORS: Madey, J. M. J.; Yearian, M. R.;

CONTRACT NO AFOSR-83-0303

PROJECT NO 2301

TASK NO A1

MONITOR: AFOSR
TR-85-1221

UNCLASSIFIED REPORT

ABSTRACT: (U) A long pulse, high brightness 45 MeV linear accelerator has been constructed for use as a driver for free electron laser and beam wave experiments, and as the first section of a 1 GeV injector for a high brightness electron storage ring. This contract has led to: 1. demonstration of the highest gradient and longest pulse length yet achieved in a 3 meter S-band SLAC-type travelling wave accelerator section; and 2. demonstration of the high current and high current density attainable through the use of a strong microwave field to replace the dc electric field usually used in linac electron guns.

DESCRIPTORS: (U) *FREE ELECTRON LASERS, *TRAVELING WAVE ELECTRON ACCELERATORS, *PUMPING(ELECTRONICS), DIRECT CURRENT, ELECTRIC FIELDS, ELECTROMAGNETIC FIELDS, ELECTRON GUNS, FABRICATION, GRADIENTS, HIGH DENSITY, HIGH ENERGY, INTERACTIONS, LINEAR ACCELERATORS, MICROCIRCUITS, MICROWAVES, SPECTROSCOPY, S BAND, ELECTRON DENSITY, ELECTRON BEAMS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2301A1

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FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Determination of Hydrogen and Oxygen in Metals with the Aid of a Helium Single Electrode Microwave Plasma Emission Technique.

85 7P

PERSONAL AUTHORS: Hanamura, S.; Wang, Weng-Jang;
Winefordner, J. D.;

CONTRACT NO F49620-84-C-0002

PROJECT NO 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-1243

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Canadian Jnl. of Spectroscopy, v30 n2 p46-49 1985.

ABSTRACT: (U) A method for the determination of traces of oxygen and hydrogen in metals has been developed. This method makes use of a low pressure gas extraction system and a single electrode helium microwave emission plasma spectrometer. The metal sample is placed in a quartz crucible which is heated by an induction furnace under Helium gas at a pressure of 400 Torr. The mixture of extracted gas and He is carried into the plasma and the atomic emission line intensities of O and H are sequentially measured with two 0.5 spectrometers. Peak areas of O (777.2 nm) and H (656.3 nm) lines are used as analytical signals for oxygen and hydrogen. A known volume of H2O is used for calibration of oxygen and hydrogen. The method is applied to the determination of oxygen and hydrogen in titanium. Keywords: Reprints; Speciation, Microwave plasma.

DESCRIPTORS: (U) *TRACER STUDIES, *DESORPTION, CALIBRATION, CRUCIBLES, DETERMINATION, EXTRACTION, FURNACES, GASES, HELIUM, HYDROGEN, INDUCTION SYSTEMS, METALS, MICROWAVES, MIXTURES, OXYGEN, PEAK VALUES, PLASMAS(PHYSICS), QUARTZ, REPRINTS, TITANIUM, EMISSION SPECTRA

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IDENTIFIERS: (U) Speciation. PE61102F, WUAFOSR2303A1

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Effects of a Magnetic Field Applied during the Curing of a Polymer Loaded with Magnetic Filler.

85 4P

PERSONAL AUTHORS: Rigbi, Z.; Mark, J. E.;

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-1207

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Polymer Science, v23
p1267-1269 1985.

ABSTRACT: (U) Magnetic particles in poly(dimethylsiloxane) can be aligned in a magnetic field. Subsequent curing gives an elastomer with highly anisotropic mechanical properties. Keywords: reinforcement; silicone elastomers.

DESCRIPTORS: (U) *MAGNETIC FIELDS, *ELASTOMERS, *REINFORCING MATERIALS, ANISOTROPY, FILLERS, MECHANICAL PROPERTIES, PARTICLES, SILICONES, CURING, CROSSLINKING(CHEMISTRY), FERRITES, POWDER METALS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 240 22/2

INTEGRATED SYSTEMS INC PALO ALTO CA

(U) Adaptive Control Techniques for Large Space Structures.

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

DCT 85 121P

PERSONAL AUTHORS: Kosut, Robert L. ; Lyons, Michael G. ;

REPORT NO. ISI-63

CONTRACT NO F49620-84-C-0054

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR 85-1241

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purchased, e.g., Egardt (1984).

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *SPACECRAFT, AIR FORCE PLANNING, ARCHITECTURE, DYNAMICS, GAIN, INTELLIGENCE, NONLINEAR SYSTEMS, STABILITY, TIME

IDENTIFIERS: (U) LSS(Large Space Structures), PEG1102F, WUAFOSR2307B1

UNCLASSIFIED REPORT

ABSTRACT: (U) The Large Space Structure (LSS) research program was originally formulated in late 1982 in response to the increasing concern that performance robustness of Air Force LSS type systems would be inadequate to meet mission objectives. In particular, uncertainties in both system dynamics and disturbance spectra characterizations (both time varying and stochastic uncertainty) significantly limit the performance attainable with fixed gain, fixed architecture controls. Therefore, the use of an adaptive system, where disturbances and/or plant models are identified prior to or during control, gives systems designers more options for minimizing the risk in achieving performance objectives. The aim of adaptive control is to implement in real-time and on-line as many as possible of the design functions now performed off-line by the control engineer; to give the controller intelligence. To realize this aim, both a theory of stability and performance of such inherently nonlinear controls is essential as well as a technology capable of achieving the implementation. As has been noted by Astrom recent advances in each of these fronts have brought us to the position where adaptive control has been applied to many processes and standard adaptive controllers can be

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DREXEL UNIV PHILADELPHIA PA DEPT OF CIVIL ENGINEERING

(U) Materials for Emergency Repair of Runways.

DESCRIPTIVE NOTE: Final rept. 1 Apr 84-14 Feb 85.

MAR 85 236P

PERSONAL AUTHORS: Popovics, Sandor ;

REPORT NO. 001120-1

CONTRACT NO. AFOSR-83-0245

PROJECT NO. 2307

TASK NO. C2

MONITOR: AFOSR
TR-85-1229

EMERGENCIES, FLEXURAL PROPERTIES, HYDRATION, INFRARED SPECTROSCOPY, INORGANIC MATERIALS, LONG RANGE (TIME), MAGNESIUM, SETTING (ADJUSTING), SHRINKAGE, STRENGTH (GENERAL), STRENGTH (MECHANICS), WARFARE, WEATHER, X RAY DIFFRACTION

IDENTIFIERS: (U) *Rapid hardening cements, PE61102F, WUAFOSR2307C2

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of this project was to identify or develop an inorganic cementing material that is suitable for emergency repair of damaged airport runways under war conditions. In the first half of the work several commercially available rapid-hardening cements were screen-tested as presented in an earlier Progress Report. It was established on this basis that the SET-45 formulas and their modifications appeared to be the most promising for achieving the given objectives of this project. These objectives were: at least 2000 psi compressive strength at the age of 1 hour; adequately long setting time; good bond to old concrete; and minimum shrinkage under every weather condition. Since then both mechanical (compressive and flexural strengths, bond, shrinkage, etc.) and physicochemical tests (X-ray diffraction, scanning electron microscopy, infrared spectroscopy, etc.) were performed with these materials to see the technically important properties of these cements under various curing conditions and learn about the basic nature of these materials. Keywords: Hydration; Magnesium cement; Setting.

DESCRIPTORS: (U) *REPAIR, *CEMENTS, *RUNWAYS, AIRPORTS, BONDED JOINTS, COMPRESSIVE PROPERTIES, CONCRETE, CURING, DAMAGE, ELECTRON MICROSCOPY, ELECTRONIC SCANNERS.

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SRI INTERNATIONAL MENLO PARK CA

CAP ABSORPTION

(U) Early MITHRAS Results: The Electric Field Response to Substorms.

IDENTIFIERS: (U) MITHRAS data base, PE61102F, WUAFQSR2310A2

DEC 83 8P

PERSONAL AUTHORS: Beaujardiere, O. de la ; Holt, J. ; Nielsen, E. ;

CONTRACT NO. F49620-83-K-0005, F49620-81-C-0042

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-85-1245

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Radio Science, v18 n6 p981-987 Nov-Dec 83.

ABSTRACT: (U) The MITHRAS data base offers a unique opportunity to observe simultaneously the auroral-zone ion convection pattern with three radars, widely separated in longitude. We attempt to separate local-time versus universal-time effects in a study of the electric field signature associated with substorms. Preliminary results indicate that this signature is similar at a given local time, regardless of the longitude of the station. In the dawn and dusk sectors the electric field is intensified, whereas around noon and midnight the electric field appears to reverse during a substorm. The potential drop across the polar cap can be estimated from the potential across the auroral oval. The radar agree well with the relationship found by Reiff and co-workers between the solar wind energy parameter epsilon and the cross-tail potential. Keywords include: Incoherent-scatter; Ionosphere; Magnetosphere; Electric fields; Substorms; Gravity waves; and Auroral zone.

DESCRIPTORS: (U) *AURORAE, *MAGNETIC STORMS, *RADAR REFLECTIONS, DATA BASES, ELECTRIC FIELDS, GRAVITY WAVES, IONOSPHERE, LONGITUDE, MAGNETOSPHERE, PARAMETERS, POLAR CAP, RADAR, REPRINTS, RESPONSE, SIGNATURES, SOLAR ENERGY, SOLAR WIND, STATIONS, TIME, INCOHERENT SCATTERING, POLAR

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 219 7/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) The Rate for Transport-Influenced Reactions.

85 4P

PERSONAL AUTHORS: Flannery, M. R. ;

REPORT NO. GIT-85-006

CONTRACT NO. AFOSR-84-0233

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0028

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in *Jnl. of Physics B: Atomic and Molecular Physics*, v18 pL747-L749 1985.

ABSTRACT: (U) The termolecular rate α at infinity for transport influenced reactions between species A and B in a gas M is expressed in terms of the averaged probability (PE) of escape pairs from the reaction zone. This procedure permits rigorous identification of the local (reaction) rate α_3 at the edge of the reaction zone, which is left unassigned by the Debye-Smoluchowski treatment. (Reprints)

DESCRIPTORS: (U) *RECOMBINATION REACTIONS, REPRINTS, GASES, TRANSPORT

IDENTIFIERS: (U) Debye Smoluchowski treatment, PE61102F, WUAFOSR860028

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AD-A164 212 6/20 15/2

CATHOLIC UNIV OF AMERICA WASHINGTON DC DEPT OF BIOLOGY

(U) In Vitro Studies of Neurotoxic Substances.

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 81-14 Sep 84.

DEC 85 118P

PERSONAL AUTHORS: Nardone, Roland M. ; Spiegel, Jack ; Mullins, J. M. ; Fedalei, A. ; Filipowski, Rene ;

CONTRACT NO. AFOSR-81-0219

PROJECT NO. 2312

TASK NO. K1

MONITOR: AFOSR
TR-85-1228

UNCLASSIFIED REPORT

ABSTRACT: (U) An in vitro strategy for the evaluation of the neurotoxic potential of chemicals was developed. A number of investigations were undertaken to validate portions of the proposed test battery. The components of the test battery which were used are as follows: neuroblastoma cell lines and chick brain cell and organ culture tester cells; acetylcholinesterase, neuron-specific enolase, and neurotoxic esterase activity, and acetylcholine receptor number as neuronal end-points; acrylamides and organophosphates as model chemicals. The research also led to the development of an in vitro alternative for the hen brain assay for neurotoxic esterase (which is predictive of delayed neuropathy), the validation of the use of phenyl 4-butyrate (which is commercially available) as a substitute substrate for phenyl valerate (which must be custom synthesized) in the neurotoxic esterase assay, and the development of an in vitro method for the evaluation of the efficacy of anti-organophosphate chemical defense agents, such as an anti-paraoxon monoclonal antibodies. Studies on acetylcholine receptors indicate that the receptor number in chick brain cultures increases with time in culture as well as with exposure to organophosphates.

DESCRIPTORS: (U) *IN VITRO ANALYSIS, *NERVOUS SYSTEM,

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*CYTOTOXIN, ACETYLCHOLINE, ACETYLCHOLINESTERASE, BRAIN, CHEMICALS, CHICKENS, ESTERASES, MODELS, ORGANOPHOSPHATES, SUBSTITUTES, SUBSTRATES, TOXICITY, VALIDATION, NERVE CELLS, EXPOSURE(PHYSIOLOGY), CHEMICAL WARFARE AGENTS

IDENTIFIERS: (U) Neurotoxins, Neurotoxicity, PE61102F, WUAFOSR2312K1

AD A164 211 9/4 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Detection of Number of Signals in Presence of White Noise

DESCRIPTIVE NOTE: Technical rept.,

OCT 85 30P

PERSONAL AUTHORS: Zhao, L. C.; Krishnaiah, P. R.; Bai, Z. D.

REPORT NO. TR-85-37

CONTRACT NO. N00014-85-K-0292, F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR AFOSR
TR-86-0039

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors propose procedures for the detection of the number of signals in presence of Gaussian white noise. The methods used fall within the framework of the model selection procedures using an information theoretic criterion. The strong consistency of the estimates of the number of signals, under different situations, is established. Extensions of the results are also discussed to the case when the noise is not necessarily Gaussian.

DESCRIPTORS: (U) *WHITE NOISE, *DETECTION, *GAUSSIAN NOISE, *MODELS, SELECTION, CONSISTENCY

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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ESSEX CORP ALEXANDRIA VA

MEDICINE, RECORDS, TRAINING, VALIDATION, VISION,
VOLUNTEERS, PREDICTIONS

(U) Predicting Subsequent Myopia in Initially Pilot-
Qualified USAFA Cadets.

IDENTIFIERS: (U) *Myopia, *Nearsightedness, Air Force,
PE61102F, WUAFOSR3005A1

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-13 Sep 85,

DEC 85 46P

PERSONAL AUTHORS: Benel, Russell A. ; Gal, Cynthia Ann ;
Benel, Denise C. R. ;

CONTRACT NO. F49620-84-C-0113

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-86-0004

UNCLASSIFIED REPORT

ABSTRACT: (U) Each year a number of previously pilot-qualified USAF Academy cadets become unqualified on the visual portion of the physical examination and become ineligible for pilot training. This research was directed at determining the ability of a measurable visual characteristic, the dark focus of accommodation, to predict the onset of myopia. Specifically, it was hypothesized that the disparity between the dark focus and the visual far point may be used as an index of the tendency to develop myopia. The cadet population was sampled for measures of the dark focus and, for those cadets who volunteered, the far point data was collected from medical records. Due to circumstances, data collection was dependent upon volunteer participants rather than a planned-for sampling procedure. The data collection was conducted at the end, rather than the beginning of the academic year. Despite the limitations noted above, there was some evidence to suggest that the hypothesis had merit. To determine the validity of the hypothesis and the suitability of the proposed measure, a longitudinal study should be conducted.

DESCRIPTORS: (U) *CADETS, *PILOTS, *VISUAL DEFECTS, *EYE,
*AIR FORCE PERSONNEL, *OFFICER PERSONNEL, DARKNESS, DATA
ACQUISITION, FOCUSING, HYPOTHESES, MEDICAL EXAMINATION,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 207 8/13

APPLIED RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) Fundamental Properties of Soils for Complex Dynamic Loadings. Development of a Three Invariant Constitutive Model. Appendices A-W.

DESCRIPTIVE NOTE: Final rept. 1 Aug 80-31 Jul 84.

APR 85 609P

PERSONAL AUTHORS: Merkle, Douglas Hall ; Dass, William Christopher ;

REPORT NO. 5230-APP-A/W

CONTRACT NO. F49620-80-C-0088

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-1232-APP

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Appendices A-W to AD-A164 206

ABSTRACT: (U) Topics in these appendices to AD-A164 206 include: stress analysis; Cayley-Hamilton invariant formulations; Octahedral plane plots; Basic equations of elastoplasticity; Vector representation of a general stress or strain state; Incremental flexibility matrix for stress control; Incremental stiffness matrix for strain control; Incremental deformation mode logic for stress control; Incremental deformation mode logic for strain control; Elastic stress-strain equations; Special equations for the triaxial test; Transient response of a three element viscoelastic model; Young's modulus for a hyperbolic stress-strain curve; A hyperbolic expression for Poisson's ratio; Hyperbolic model for cyclic simple shear; Yield surface violation correction for an elastic-perfectly plastic model; AFWL engineering model incremental plastic response; Drained and undrained cap models and computational algorithms; Lade model cross sections and parameter determination; Conic model cross sections and parameter determination.

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AD-A164 207 CONTINUED

DESCRIPTORS: (U) *SOIL DYNAMICS, ALGORITHMS, COMPUTATIONS, CONICAL BODIES, CONTROL, CROSS SECTIONS, CYCLES, DEFORMATION, DETERMINATION, ELASTIC PROPERTIES, EQUATIONS, GRAPHS, HYPERBOLAS, INVARIANCE, LOGIC, MATRICES(MATHEMATICS), MODELS, PARAMETERS, POISSON'S, RATIOS, RESPONSE, SHEAR PROPERTIES, SOILS, STIFFNESS, STRAIN(MECHANICS), STRESS ANALYSIS, STRESS STRAIN RELATIONS, STRESSES, SURFACES, TRANSIENTS, VECTOR ANALYSIS, VISCOELASTICITY, YIELD

IDENTIFIERS: (U) PE61102F, WUAFOSR2307C1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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APPLIED RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) Fundamental Properties of Soils for Complex Dynamic Loadings. Development of a Three Invariant Constitutive Model.

DESCRIPTIVE NOTE: Final rept. 1 Aug 80-31 Jul 84.

APR 85 104P

PERSONAL AUTHORS: Merkle, Douglas Hall ;Dass, William Christopher ;

REPORT NO. 5230

CONTRACT NO. F49620-80-C-0088

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-1232

conic model performs well over a wide range of loading conditions. The parameters are determined in a straightforward manner, and the model reflects the influence of the intermediate principal stress on shear strength through a shear failure surface involving three independent stress invariants: the first total stress invariant and the second and third deviator stress invariants. The conic model also exhibits dilatancy, generates only positive plastic work, and has a provision for strain softening in shear.

DESCRIPTORS: (U) *SOIL DYNAMICS, ACCURACY, COMPUTER PROGRAMS, CONICAL BODIES, DETERMINATION, DYNAMIC LOADS, FAILURE(MECHANICS), INVARIANCE, MATHEMATICS, MODELS, PARAMETERS, PATHS, RANGE(EXTREMES), SHEAR PROPERTIES, SHEAR STRENGTH, SOIL MECHANICS, SOILS, STRAIN(MECHANICS), STRESS STRAIN RELATIONS, STRESSES, SURFACES

IDENTIFIERS: (U) PE61102F, WUAFOSR2307C1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendices A-W, AD-A164 207.

ABSTRACT: (U) This study sought to develop a general soil stress-strain model which can be used to solve a wide range of soil dynamics problems. The approach used was to review existing soil constitutive models used to predict the response of soil masses to complex dynamic loads, and then formulate a new model for that purpose. Eight existing soil dynamic stress-strain models were studied. The Lade model was selected as the best point of departure for developing a new soil stress-strain model for complex dynamic loading, because of its accuracy and flexibility in representing soil stress-strain behavior, ease of parameter determination, and ease of developing intuition for parameter physical significance and accuracy. The new conic model is so called because its principal mathematical surfaces are conic sections. The computer code used to exercise all nine soil constitutive models under eleven stress and strain paths is called the Soil Element Model (SEM). It can be incorporated in large finite difference or finite element codes for analyzing the response of soil masses to complex dynamic loads. The

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AD-A164 193 11/4 12/1

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MECHANICAL
ENGINEERING

(U) Nonlinear Dynamic Response of Composite Rotor Blades.

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

SEP 84 84P

PERSONAL AUTHORS: Engblom, John J. ; Ochoa, Ozden O. ;

REPORT NO. ME-4786-84-9

CONTRACT NO. F49620-82-K-0032

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-85-1235

UNCLASSIFIED REPORT

ABSTRACT: (U) Summarized are research activities related to Nonlinear Dynamic Response of Composite Rotor Blades. fundamental to the analysis is the development of a continuum formulation that can accurately account for the effects of interlaminar shear and interlaminar normal stress variation thru the thickness of a laminate. Technical highlights of the research efforts to date are presented for each of the proposed tasks; namely, Nonlinear Displacement Formulation for Composite Media, Incorporate Damage Mechanisms into Dynamic Response Formulation and Correlation of Formulated Response Model with Experimental data. Keywords: Composite materials; Finite Elements; Large Displacement Formulation; Interlaminar Shear and Normal Stresses; Assumed Displacement and Hybrid Models.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *ROTOR BLADES, COMPOSITE STRUCTURES, CONTINUUM MECHANICS, DAMAGE, DISPLACEMENT, DYNAMIC RESPONSE, FINITE ELEMENT ANALYSIS, FORMULATIONS, HYBRID SYSTEMS, MEDIA, MODELS, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, RESPONSE, LAMINATES

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1

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STANFORD UNIV CA

(U) Storage Ring Technology for Free Electron Lasers.

DESCRIPTIVE NOTE: Final technical rept. 25 Apr 83-24 Apr 84,

APR 84 198P

PERSONAL AUTHORS: Madey, J. M. J. ; Deacon, D. A. G. ;

CONTRACT NO. F49620-83-K-0030

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-1223

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Laser operation was achieved and a series of discoveries on the operational characteristics of storage ring lasers were made including self pulsing and transverse mode coupling. the self pulsing phenomenon was observed to permit the continuous variation of the peak output power of the device. Analysis of the data taken on the optical klystron and the laser induced bunch lengthening was completed. Contents: Measurement of stimulated transverse mode mixing in a free electron laser; Transverse Mode dynamics in a free electron laser; Measurement of the violation of the Madey Theorem induced by a diverging wave; Observation of the diffraction induced violation of the Madey theorem; Optical klystron experiments for the ACO storage ring free electron laser; Characterization of free electron laser bunch lengthening on the ACO storage ring; Inhomogeneous Broadening calculation with a single integral; and Realization of a variable aperture diaphragm working in ultra high vacuum.

DESCRIPTORS: (U) *ELECTRON ACCELERATORS, *FREE ELECTRON LASERS, *PUMPING(ELECTRONICS), DIFFRACTION, OUTPUT, PEAK POWER, RINGS, STORAGE, LASERS, DYNAMICS, TRANSVERSE, KLYSTRONS, OPTICAL PROPERTIES, MIXING, TRANSVERSE, RING LASERS, STORAGE, COUPLING(INTERACTION), ULTRAHIGH VACUUM.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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PULSED LASERS

IDENTIFIERS: (U) *Storage rings, PE61102F, WUAFOSR2301A1

AD-A164 191 11/4 20/11

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS RESEARCH CENTER

(U) Residual-Stress Induced Damage in Composite Materials.

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

APR 85 19P

PERSONAL AUTHORS: Weitsman, Y. ;

REPORT NO. MM-5022-85-5

CONTRACT NO. AFOSR-84-0069

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-85-1224

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objective of this research is to evaluate the role of temperature and moisture as damage inducing agents in composites. This objective is to be achieved by subjecting composite coupons to several excursions of temperature and humidity, with variations in both amplitudes and rates, and inspecting the resulting damage. Furthermore, the formation and growth of damage are to be modelled analytically in order to relate them to material properties and ambient environmental conditions. Keywords: Air Force research; computations; residual stresses.

DESCRIPTORS: (U) *RESIDUAL STRESS, *COMPOSITE MATERIALS, AIR FORCE RESEARCH, COMPUTATIONS, DAMAGE, GROWTH(GENERAL), HUMIDITY, MOISTURE, TEMPERATURE

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 189 20/6
 MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
 RESEARCH
 (U) Continuous Representations of Digital Images.
 DESCRIPTIVE NOTE: Technical rept.,
 OCT 85 35P
 PERSONAL AUTHORS: Lee, Chung-Nim ; Rosenfeld, Azriel ;
 REPORT NO. CAR-TR-158, CS-TR-1569
 CONTRACT NO. F49620-85-K-0009
 PROJECT NO. 2304
 TASK NO. A7
 MONITOR: AFOSR
 TR 85-1218

UNCLASSIFIED REPORT

ABSTRACT: (U) A 2D digital image S is represented conventionally by the union of grid squares containing pixels of S which we denote by $F(S)$. This gives the correct topology for S with 8-adjacency, and with a little imagination, 4-adjacency can also be properly handled. However, one encounters difficulty in extending basic 2D results to 3D digital images. The last few years have seen the need for better methods which give a closer link with well developed continuous topology, especially with the advent of digital surface theory. We define a new continuous model $F(S)$ by refining $F(S)$. We show that this gives a better bridge between the two subjects, digital and continuous topologies. We also show how this space $F(S)$ is related to two other continuous models. Although we concentrate only on 2D images in this paper, the concepts and general ideas extend to 3D images. A 3D version of this paper is in preparation.

DESCRIPTORS: (U) *OPTICAL IMAGES, TWO DIMENSIONAL, THREE DIMENSIONAL, MODELS, DIGITAL SYSTEMS, TOPOLOGY, SURFACES, THEORY, IMAGES

IDENTIFIERS: (U) *Digital images, WUAFOSR2304A7, PE61102F

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 ILLINOIS UNIV AT URBANA DEPT OF ELECTRICAL AND COMPUTER
 ENGINEERING
 (U) Non-Linear Optical Techniques for Visible and UV
 Lasers and Thin Film Deposition.
 DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 85,
 NOV 85 18P
 PERSONAL AUTHORS: Eden, J. G. ;
 CONTRACT NO. F49620-83-C-0003
 PROJECT NO. 2301
 TASK NO. A1
 MONITOR: AFOSR
 TR-85-1222

UNCLASSIFIED REPORT

ABSTRACT: (U) Thin Metal films have been deposited by a multiphoton ionization technique. Laser-initiated semi-conduct thin-film growth has been demonstrated and laser irradiation of the substrate has produced higher quality films than that obtained by growth without the laser. Also, laser induced breakdown (LIB) has been shown to be a highly sensitive technique for detecting minute impurities. In addition, a significant improvement in XeCl laser energy output has been realized by the injection of a low intensity UV laser pulse into the XeCl laser cavity.

DESCRIPTORS: (U) *PHOTOIONIZATION, *LASER APPLICATIONS, *SEMICONDUCTING FILMS, *DEPOSITION, *METAL FILMS, QUALITY, LASERS, METHODOLOGY, SENSITIVITY, THIN FILMS, IMPURITIES, LASER CAVITIES, IRRADIATION, LASER BEAMS, SUBSTRATES, ULTRAVIOLET LASERS, EXCIMERs

IDENTIFIERS: (U) Multiphoton ionization, Xenon chloride lasers, PE61102F, WUAFOSR2301A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND
MATERIALS RESEARCH CENTER

of a potential even when there are large increases in
microcracking. (Author)

(U) Damage Models for Delamination and Transverse Fracture
in Fibrous Composites.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *FIBERS, AXES,
BEHAVIOR, CONSTANTS, CRACK PROPAGATION, DAMAGE,
DEFORMATION, DISTRIBUTION, ELASTIC PROPERTIES, ENERGY,
FINITE ELEMENT ANALYSIS, FRACTURE (MECHANICS),
MICROCRACKING, MODELS, PLASTIC PROPERTIES,
STRAIN (MECHANICS), THEORY, TORSION, TRANSVERSE, UNLOADING,
WORK, LAMINATES

DESCRIPTIVE NOTE: Annual technical rept. 15 Feb 84-14 Feb
85.

MAY 85 74P

IDENTIFIERS: (U) PE61102F, WUAFOSR2302R2

PERSONAL AUTHORS: Schapery, R. A. ; Weatherby, J. R. ; Tonda,
R. D. ;

REPORT NO. MM-5034-85-8

CONTRACT NO. AFOSR-84-0068

PROJECT NO. 2302

TASK NO. 82

MONITOR: AFOSR
TR-85-1226

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental work on the
deformation and fracture of fibrous composites with
distributed damage is described. Emphasis is on
establishing the existence of potentials analogous to
strain energy and on using these so-called work
potentials in fracture studies. The difference between
loading and unloading behavior is accounted for by using
one work potential for changing damage (loading) and
another for constant damage (unloading). First, using
work potentials in a finite element representation, a new
method for predicting crack growth is described which is
believed to be applicable to many different materials.
The results confirm the previously predicted path
independence of the J integral for a crack in a continuum
with distributed damage; the damage is modelled in this
initial study using deformation plasticity theory for
loading and elasticity theory for unloading. Described
next are investigations of flat rectangular bar specimens
and thin walled tubes under axial and torsional loading.
The limited amount of experimental data presently
available on angle-ply laminates confirms the existence

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TENNESSEE UNIV SPACE INST TULLAHOMA

SYSTEMS, SHAPE, SPECTROSCOPY, TEMPERATURE, TEST
FACILITIES, THERMAL PROPERTIES, THERMAL RADIATION,
VELOCITY, RADIATION ABSORPTION, CARBON DIOXIDE LASERS

(U) Laser Thermal Propulsion.

IDENTIFIERS: (U) Laser produced plasmas, Laser
propulsion, PEG1102F, WUAFOSR2308K1

DESCRIPTIVE NOTE: Annual rept. 15 Jan 84-14 Apr 85,

AUG 85 6P

PERSONAL AUTHORS: Keefer, Dennis ;

CONTRACT NO. AFOSR-83-0043

PROJECT NO 2308

TASK NO K1

MONITOR AFOSR
TR-85-0029

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this research investigation is to determine experimentally the effects of a forced convection environment and optical geometry on the stability, fractional power absorption, plasma structure, and fluid mixing in a laser sustained plasma (LSP). A continuous, 1.5 kw, axial flow, carbon dioxide laser was used to create the LSP in a cylindrical quartz flow channel. The convection flowfield surrounding the plasma was controlled by the volume flow through the test chamber, and the optical geometry was determined by the focal length of the lens. Data were obtained for argon plasmas at pressures from 1 to 2.3 atmospheres, mean incident flow velocities to cm/s and nominal incident laser power of 1 kw. Spatially resolved measurements of the plasma temperature were obtained from spectral images of the LSP and, using these measured temperatures, it was possible to determine the spatially resolved laser power absorption and thermal emission within the plasma. Substantial differences in plasma shape, absorbed power, and pressure dependence were found for lenses of different focal length. Keywords: Laser Propulsion; Laser Sustained Plasmas; Plasma Spectroscopy; Argon Plasmas.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *ELECTRIC PROPULSION,
*LASER PUMPING, ARGON, AXIAL FLOW, CHANNELS, CONVECTION,
CYLINDRICAL BODIES, EMISSION, FLOW FIELDS, FRACTIONATION,
LENGTH, LENSES, OPTICAL PROPERTIES, POWER, PROPULSION

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AD-A164 162 20/11

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT
OF AEROSPACE AND OCEAN ENGINEERING

(U) Experimental Study of Active Vibration Control.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 83-31 Dec
84.

FEB 85 66P

PERSONAL AUTHORS: Hallauer, William L., Jr.; Nayak, Arun P.

CONTRACT NO. F45620-83-C-0158

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-85-1234

UNCLASSIFIED REPORT

ABSTRACT: (U) Three different types of active vibration damping were implemented on a pendulous, two-dimensional laboratory structure having high modal density at low frequencies (0-10 Hz) and very light inherent damping. The most effective control system included an array processor (the controller) and five pairs of dual (collocated) velocity sensors and force actuators. This control system was used for implementation of two different active damping techniques, uncoupled and coupled rate feedback. The latter was based on modal-space active damping. Both techniques produced heavy active damping of eleven modes with natural frequencies under 10 Hz, and both positively augmented the damping of all modes. Both techniques were proven to be completely stable and stability robust relative to errors in the structure theoretical model. Very good agreement was achieved between experimentally measured and theoretically calculated structure control system dynamic response. The most significant result is that the technique of coupled rate feedback with dual sensors and actuators effectively damped many more modes than the number of control actuators while producing no spillover instability.
(Author)

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NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE
AND ENGINEERING

aluminum alloys. (Author)

(U) Synthesis and Properties of Elevated Temperature P/M
Aluminum Alloys.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, ALLOYS, ALUMINUM, ARC
MELTING, CREEP, DILUTION, DISPERSING, DISPERSIONS, HEAT
RESISTANT ALLOYS, HIGH TEMPERATURE, INTERFACES, LOW
ENERGY, MATRIX MATERIALS, MELTING POINT, METASTABLE STATE,
MICROSTRUCTURE, MOLYBDENUM ALLOYS, PARTICLES, PHASE,
PRECIPITATES, STABILITY, SUBSTITUTES, SYNTHESIS, VANADIUM,
VANADIUM ALLOYS, ZIRCONIUM, ZIRCONIUM ALLOYS, IRON ALLOYS,
CERIUM ALLOYS, STRENGTH(GENERAL)

DESCRIPTIVE NO E: Final rept. 1 Oct 81-30 Sep 85.

NOV 85 114P

IDENTIFIERS: (U) PE61102F, WUAFQSR2306A1

PERSONAL AUTHORS: Fine, Morris E. ; Weertman, Julia R. ;

CONTRACT NO. AFOSR-82-0005

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
1R-85-1258

UNCLASSIFIED REPORT

ABSTRACT: (U) The microstructure of the aluminum base-
iron-cerium and iron-molybdenum-vanadium alloys, which
were developed for use up to 316 degrees centigrade, is
not stable at 425 degrees centigrade (three-quarters of
the absolute melting temperature of aluminum). Metastable
dispersed phases are replaced by stable phases and
particles of these coarsen rather rapidly with time.
Creep loading accelerates these processes. Trialuminum-
zirconium was predicted to be a preferable dispersed
phase for strengthening aluminum for the 425 C
temperature range because of good lattice matching with
the aluminum matrix giving a low interfacial energy. This
is true for the thermodynamically stable tetragonal phase
but especially true for the metastable cubic phase.
Dilute alloys were prepared by arc melting and these were
aged to form precipitate dispersed phase. Substitution of
vanadium for zirconium improved the lattice parameter
matching for both cubic and tetragonal trialuminum-
zirconium as well as increasing the stability of the
cubic form. The coarsening rates of the particles at 425
C were 100 to 1000 times slower than for the aluminum-
iron-cerium or molybdenum alloys, the aluminum-zirconium-
vanadium alloy being better than the binary aluminum-
zirconium alloy in this respect. These alloys are very
promising as the basis for better high temperature

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AD-A164 147 7/4 20/10
MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Energy and Chemical Change.

DESCRIPTIVE NOTE: Final rept. 1981-1985.

NOV 85 15P

PERSONAL AUTHORS: Levine, R. D. ; Kinsey, J. L. ;

CONTRACT NO. AFOSR-81-0030

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-85-0030

UNCLASSIFIED REPORT

ABSTRACT: (U) The introduction and application of an algebraic approach to molecular structure and dynamics is reviewed. The key points which are discussed are the motivation and basic elements of the formalism, applications to vibrational overtone spectroscopy of triatomic molecules, the interpretation of the approach in geometrical terms, the extension to scattering and to time dependent phenomena, the characterization of quantum chaos, dynamic surprisal synthesis and stochastic processes.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *CHEMICAL REACTIONS, *QUANTUM CHEMISTRY, ALGEBRA, APPROACH, CHEMICALS, DYNAMICS, GEOMETRY, MOTIVATION, POLYATOMIC MOLECULES, SCATTERING, SPECTROSCOPY, STOCHASTIC PROCESSES, SYNTHESIS, TIME DEPENDENCE

IDENTIFIERS: (U) Molecular dynamics, PE61102F, WUAFOSR2303B1

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CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Precipitation of Reinforcing Filler into Polydimethylsiloxane Prior to Its End Linking Into Elastomeric Networks.

85 5P

PERSONAL AUTHORS: Ning, Y. P. ; Mark, J. E. ;

CONTRACT NO. AFOSR-83-0027, NSF-DMR79-18903

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-1206

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Polymer Science, v30 p3519-3522 1985.

ABSTRACT: (U) Particulate fillers having high surface area are much used for the reinforcement of elastomers, classic sample being the addition of carbon black to natural rubber. Another equally important example is the addition of silica (SiO₂) to polydimethylsiloxane (PDMS Si(CH₃)₂O-), which would otherwise yield elastomers much too weak for most applications. Such fillers are generally blended into the (uncrosslinked) polymers, which are invariably of sufficiently high molecular weight (and viscosity) to greatly complicate the mixing process. For this and other reasons, methods were recently developed for either precipitating silica into already-formed networks, or precipitating it simultaneously with the curing process. The reaction is the simple, catalyzed hydrolysis of tetraethylorthosilicate (TEOS): Si(OC₂H₅)₄ + 2H₂O yields SiO₂ + 4C₂H₅OH. In this in situ technique, however, removal of the byproduct C₂H₅OH and unreacted TEOS cause a significant decrease in volume, which could be disadvantageous in some applications. The present investigation was undertaken to determine a practical way to avoid this difficulty. The specific goal was the precipitation of the silica into samples of PDMS to give stable polymer-filler suspensions which remained capable

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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of being end linked, subsequently, with no substantial changes in volume.

DESCRIPTORS: (U) *CHEMICAL PRECIPITATION, *SILICON DIOXIDE, *ELASTOMERS, *REINFORCING MATERIALS, CURING, LINKAGES, SURFACES, NATURAL RUBBER, METHYL RADICALS, POLYMERS, SILOXANES, CARBON BLACK, MOLECULAR WEIGHT, MIXING, FILLERS, PARTICULATES, VISCOSITY, SILICON DIOXIDE, YIELD, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

AD-A164 131 7/4 18/2 20/10

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Vibrationally Assisted Tunnelling (VAT) in a 1,5 Hydrogen Shift?

85 5P

PERSONAL AUTHORS: Dewar, Michael J. ; Merz, Kenneth M. ; Stewart, James J. ;

CONTRACT NO. F49620-83-C-0024

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-85-1012

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Chemical Communications, p166-168 1985.

ABSTRACT: (U) Vibrationally assisted tunnelling, kinetic isotope effect, and MINDO/3 calculations are reported for the 1,5 hydrogen migration of penta-1,3-diene; from the calculations it is demonstrated that tunnelling affects the kinetic isotope effect of this rearrangement and the 1,5 shift should proceed via VAT almost exclusively at 498 K. (Reprints)

DESCRIPTORS: (U) *ISOTOPE EFFECT, *REACTION KINETICS, *TUNNELING (ELECTRONICS), *HYDROGEN, KINETICS, REPRINT, VIBRATION, MINDO MOLECULAR ORBITALS, DIENES, QUANTUM THEORY

IDENTIFIERS: (U) MINDO (Modified Intermediate Neglect Differential Overlap), PE61102F, WUAFOSR2303B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 121 11/5

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND
MATERIALS RESEARCH CENTER

(U) Research on Damage Models for Continuous Fiber
Composites.

DESCRIPTIVE NOTE: Annual technical rept. Feb 84-Feb 85,

FEB 85 118P

PERSONAL AUTHORS: Allen, D. H. ; Haister, W. E. ; Harris, C. E.

REPORT NO. MM-5023-85-4

CONTRACT NO. AFOSR-84-0067

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-85-1225

UNCLASSIFIED REPORT

ABSTRACT: (U) Continuous fiber composite laminate are known to undergo a substantial amount of complex load-induced damage which can adversely affect component performance. Therefore, it is desirable to develop new models capable of accounting for the effect of damage on materials properties. The objective of this research is to develop an accurate damage model for predicting strength and stiffness of continuous fiber composite media subjected to fatigue or monotonic loading and to verify this model with experimental results obtained from composite specimens of selected geometry and makeup to be described herein. Keywords: Laminate analysis; Failure; Finite element methods; Internal state variables; and Plasticity.

DESCRIPTORS: (U) *FIBERS, *LAMINATES, COMPOSITE MATERIALS, CONTINUUM MECHANICS, DAMAGE, FINITE ELEMENT ANALYSIS, INTERNAL, MODELS, PLASTIC PROPERTIES, STIFFNESS, VARIABLES

IDENTIFIERS: (U) PE611027F, WUAFOSR2302B2

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AD-A164 118 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Tests for the Dimensionality of the Regression Matrices When the Underlying Distributions are Elliptically Symmetric.

DESCRIPTIVE NOTE: Technical rept.,

OCT 85 28P

PERSONAL AUTHORS: Krishnalah, P. R. ; Lin, J. ; Wang, L. ;

REPORT NO. TR-85-36

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0037

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the authors derive likelihood ratio tests for the dimensionality of the regression matrices for the cases when the joint distributions of the observations are real and complex elliptically symmetric. The authors also derive asymptotic distributions of the above test statistics for two situations. In the first situation, the joint distribution of the observations is elliptically symmetric whereas the second situation assumes that the observations are distributed independently as elliptically symmetric. Keywords: Asymptotic distributions, Elliptically symmetric distributions, and Multivariate regression model.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, *STATISTICAL TESTS, *MATRICES(MATHEMATICS), MATHEMATICAL MODELS, MULTIVARIATE ANALYSIS, SYMMETRY, ASYMPTOTIC SERIES, DISTRIBUTION FUNCTIONS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 114 21/2 7/4

AD-A164 114 CONTINUED

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

with a single-beam excitation scheme. (Reprints)

(U) A Theoretical and Experimental Investigation of the
Technique of Laser-Intermodulated Fluorescence for
Scattering Correction in Atomic Fluorescence
Spectrometry,

DESCRIPTORS: (U) *ATOMIC SPECTROSCOPY, *INTERMODULATION,
*FLAMES, *FLUORESCENCE, *ARGON, DIFFERENCE FREQUENCY,
ELECTRON TRANSITIONS, HYDROGEN, IRRADIATION, LASER BEAMS,
MODULATION, OXYGEN, REPRINTS, RESONANCE, SCATTERING,
SODIUM, SQUARE WAVES, WAVEFORMS

85 14P

IDENTIFIERS: (U) WUAFOSR2303A1, PE61102F

PERSONAL AUTHORS: Hart, L. P. ; Alkemade, C. T. J. ; Omenetto,
N. ; Winefordner, J. D. ;

CONTRACT NO. F49620-84-C-0002

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-1255

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Applied Spectroscopy, v39 n4
p677-668 1985

ABSTRACT: (U) A theoretical derivation is presented of
the signal obtained with the technique of intermodulated
atomic fluorescence spectroscopy. One laser beam, tuned
at a selected atomic transition, is divided into two beams
which are then amplitude modulated at different
frequencies and recombined in a flame containing the
vapor of the element investigated. The fluorescence
signal at the same or difference frequency is measured.
The derivation is given for both square-wave and
sinusoidal modulation. It is shown that the
intermodulated fluorescence amplitude depends upon the
square of the laser spectral irradiance at low powers and
reaches a plateau at high irradiances, but only in the
case of square-wave modulation. For sinusoidal modulation
a maximum is reached followed by a roll off at high
irradiances. The theoretical predictions are verified
experimentally with a square wave modulated continuous
wave dye laser for the case of sodium resonance
fluorescence in an oxygen argon hydrogen flame. The
scatter signal has no intermodulation component. Finally,
it is shown that when the modulation waveform is not
square wave, scattering correction can also be achieved

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 112 9/2

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
RESEARCH

(U) Parallel Processing of Region Boundaries.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 18P

PERSONAL AUTHORS: Wu, Angela Y.; Bhaskar, S. K.; Rosenfeld,
Azriel;

REPORT NO. CAR-TR-159, CS-TR-1573

CONTRACT NO. F49620-85-K-0009

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-85-1216

UNCLASSIFIED REPORT

ABSTRACT: (U) A region may be represented by specifying the curves that bound it. When p processors are available, typical operations on regions so represented can be performed much faster than using a single processor. This paper presents parallel algorithms to determine properties of regions, such as area; to perform operations on regions, such as union and intersection; to determine if a point lies inside a region; and to determine whether a given digital curve could be the boundary of a region. Some of the algorithms involve sorting, the time complexity of which depends on the particular model of parallel computation used. (Author)

DESCRIPTORS: (U) *PARALLEL PROCESSING, BOUNDARIES, ALGORITHMS, COMPUTATIONS, MODELS, TIME, DIGITAL SYSTEMS, GRAPHS, OPERATION, REGIONS, PROCESSING EQUIPMENT

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7

AD-A164 093 12/1 9/4

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) The Relative Entropy of a Random Vector with Respect to Another Random Vector.

DESCRIPTIVE NOTE: Technical rept.,

OCT 85 72P

PERSONAL AUTHORS: Rosenblatt, Roth, M.;

REPORT NO. TR-85-35

CONTRACT NO. F49620-82-K-0001

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0036

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper discusses some problems connected with the concept of entropy. Keywords: Additivity theorems; Entropy; Information theory. Relative entropy is defined as $h(x|\eta) + h(x|\eta)$ a measure of the random variables $x|\eta$

DESCRIPTORS: (U) *ENTROPY, *INFORMATION THEORY, RANDOM VARIABLES

IDENTIFIERS: (U) Relative entropy, Additivity theorems, WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 092 11/10

AD-A164 092 CONTINUED

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Bimodal Networks and Networks Reinforced by the in situ Precipitation of Silica,

85 7P

PARTICLES, PRECIPITATION, REINFORCING MATERIALS, SILICON DIOXIDE, CHEMICAL PRECIPITATION, REPRINTS, CHAINS, STRESSES, REDUCTION, STRESS STRAIN RELATIONS

IDENTIFIERS: (U) PE61102F, WUAFQSR2303A3

PERSONAL AUTHORS: Mark, James E. ;

CONTRACT NO. AFOSR-83-0027, NSF-DMR79-18903

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-1253

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in British Polymer Jnl., v17 n2
p144-148 1985.

ABSTRACT: (U) The goal of primary interest in these investigations was the development of novel methods for preparing elastomeric networks having unusually good ultimate properties. The first technique employed involves endlinking mixtures of very short and relatively long functionally-terminated chains to give bimodal networks. Such (unfilled) elastomers show very large increases in reduced stress or modulus at high elongations because of the very limited extensibility of the short chains present in the networks. The second technique employs in situ precipitation of reinforcing silica either after, during, or before network formation. The reaction involves hydrolysis of tetraethylorthosilicate, using a variety of catalysts and precipitation conditions, and the effectiveness of the technique is gauged by stress-strain measurements carried out to yield values of the maximum extensibility, ultimate strength, and energy of rupture of the filled networks. Information on the filler particles thus introduced is obtained from density determinations, light scattering measurements, and electron microscopy.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *ELASTOMERS, DUAL MODE, NETWORKS, ELECTRON MICROSCOPY, FILLING, LIGHT SCATTERING, MEASUREMENT, CATALYSTS, ENERGY, RUPTURE.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A164 090 CONTINUED

SRI INTERNATIONAL MENLO PARK CA

(U) Some Properties of the Auroral Thermosphere Inferred
from Initial EISCAT (European Incoherent Scatter
Facility) Observations.

IDENTIFIERS: (U) EISCAT (European Incoherent Scatter
Facility), PE61102F, WUAFOSR2310A2

DEC 83 7P

PERSONAL AUTHORS: Alcayde, D. ; Fontanari, J. ; Bauer, P. ; la
Beaujardiere, O. de ;

CONTRACT NO. F49620-83-K-0005, F49620-81-C-0042

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR 85-1248

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Radio Science, v18 n6 p881-
886 Nov-Dec 83.

ABSTRACT: (U) Using the equation of ion energy
conservation, preliminary calculations of thermosphere
neutral-temperature profiles and atomic oxygen
concentrations are made for 2 days of EISCAT incoherent
scatter radar data. Since the original method currently
applied at mid-latitudes is not valid when joule heating
of the ions occurs, we extended it to take joule heating
into consideration. However, this new method is not valid
if joule heating occurs simultaneously with electron
heating by particle precipitation or photoelectrons. We
show that the electron continuity equation around 200 km
altitude can be applied to identify the periods of
particle precipitation. Keywords include: Incoherent-
scatter, Ionosphere, Thermosphere, Electron density, Ion
temperature, Electron temperature, Electric fields,
Auroral zone, and Interplanetary magnetic fields.

DESCRIPTORS: (U) *RADAR REFLECTIONS, *THERMOSPHERE,
*AURORAE, OXYGEN, ELECTRIC FIELDS, ELECTRON DENSITY,
ELECTRON ENERGY, INCOHERENT SCATTERING, INTERPLANETARY
SPACE, MAGNETIC FIELDS, ELECTRONS, HEATING, EQUATIONS,
ENERGY CONSERVATION, IONS, TEMPERATURE, PARTICLES,
PRECIPITATION, REPRINTS, PHOTOELECTRONS, THERMOSPHERE

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AD-A164 082 CONTINUED

GEORGE WASHINGTON UNIV WASHINGTON DC SCHOOL OF
ENGINEERING AND APPLIED SCIENCE

FATIGUE LIFE, METHODOLOGY, PREDICTIONS, BEHAVIOR, STRESS
RELAXATION, MODELS

(U) Life Prediction for a Structural Material under Cyclic
Loads with Hold Times Using a Viscoplastic
Constitutive Model.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B1

DESCRIPTIVE NOTE: Final rept. 1 Feb 83-31 Jan 84.

DEC 84 127P

PERSONAL AUTHORS: Eftis, J. ; Jones, D. L. ;

CONTRACT NO. AFOSR-83-0066

PROJECT NO. 2307

TASK NO. 81

MONITOR: AFOSR
TR-85-1237

UNCLASSIFIED REPORT

ABSTRACT: (U) This investigation demonstrates the ability of the Chaboche viscoplastic constitutive theory to model the behavior of Ti-6Al-4V alloy at non-elevated temperature. The range of material behavior considered includes uniaxial monotonic stress-strain primary creep, stress relaxation, kinematic and isotropic hardening (and softening) under cyclic loading with and without hold times. The six materials parameters of the viscoplastic theory were evaluated from a series of strain-controlled stabilized cyclic loading tests, and room temperature primary creep tests. The viscoplastic strain calculations were integrated into a fatigue life prediction methodology for low cycle fatigue. Two sets of low cycle fatigue life predictions were carried out and compared with experimental data. One involved strain-controlled cyclic loading without hold times, and the other stress-controlled cyclic loading with hold times. Good agreement was found between predicted and actual results.

DESCRIPTORS: (U) *TITANIUM ALLOYS, *ALUMINUM ALLOYS, *VANADIUM ALLOYS, *VISCOPLASTIC PROPERTIES, STRESS STRAIN RELATIONS, COMPUTATIONS, CREEP, ROOM TEMPERATURE, CYCLES, LOADS(FORCES), HARDENING, ISOTROPISM, KINEMATICS, MATERIALS, PARAMETERS, CONTROL, CYCLES, STRAIN(MECHANICS).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 080 21/2 20/4 12/1

AD-A164 080 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL
ENGINEERING

(U) Numerical Simulation of Turbulent Flames Using Vortex
Methods.

DESCRIPTIVE NOTE: Annual progress rept. no. 1, 1 Sep 84-
31 Aug 85.

OCT 85 14P

PERSONAL AUTHORS: Ghoniem, Ahmed F. ;

CONTRACT NO. AFOSR-84-0356

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-1238

in terms of the equivalence ratio. Keywords: Combustion;
Turbulent shear flow; Flame propagation; and Navier
Stokes equations.

DESCRIPTORS: (U) +COMBUSTION STABILITY, +NUMERICAL
ANALYSIS, +FLAME PROPAGATION, +FLAMES, +VORTICES,
ACCURACY, ALGORITHMS, COMPUTATIONS, MATHEMATICAL MODELS,
HIGH RATE, REYNOLDS NUMBER, LAGRANGIAN FUNCTIONS,
HARMONICS, MODULATION, LAYERS, MIXING, NAVIER STOKES
EQUATIONS, RECIRCULATION, STABILITY, TURBULENCE, THREE
DIMENSIONAL, NUMERICAL METHODS AND PROCEDURES, SHEAR
PROPERTIES, DIFFUSION, SIMULATION, STOCHASTIC PROCESSES,
TURBULENT FLOW

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2

UNCLASSIFIED REPORT

ABSTRACT: (U) Vortex schemes for direct numerical
simulation of turbulence are developed to study the
propagation and stability of turbulent flames. Attention
is focused on the construction of accurate and efficient
computational algorithms that are easily extendable to
three dimensional reacting flow at high Reynolds numbers.
A Lagrangian vortex scheme, which incorporates stochastic
simulation of diffusion, was used to obtain solutions for
a recirculating flow and a mixing layer. Results showed
good agreement with experimental data at intermediate
Reynolds number for the first case, and was used to
establish the convergence of the numerical method, the
sources of errors and the appropriate scheme to improve
the accuracy efficiently. For the mixing layer, the
simulation predicted the average velocity and the
streamwise fluctuations accurately, but overpredicted the
cross-stream fluctuation, indicating that the latter are
governed by the three dimensional effects. The response
of the layer to harmonic modulations was analyzed
revealing the nature of the flow and indicating how
entrainment can be enhanced in shear flow. The
relationship between the flow instability and the
combustion stabilization in both cases indicated the
premixed flames have a narrow range of stable existence

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 075 20/6
 HUGHES RESEARCH LABS MALIBU CA
 (U) Investigation of Optical Fibers for Nonlinear Optics.
 DESCRIPTIVE NOTE: Annual rept 1 Apr 84-31 Mar 85.
 NOV 85 68P
 PERSONAL AUTHORS: DeShazer, Larry ; Pastor, Antonio ; Rand, Stephen ;
 CONTRACT NO. F49620-84-C-0043
 PROJECT NO. 2305
 TASK NO. B2
 MONITOR: AFOSR
 TR 86-0009

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this research program is to develop single-crystal (SC) fibers for use in nonlinear optical devices. This encompasses measurement of physical and chemical properties of several candidate materials, fabrication of SC fibers, and investigation of nonlinear optical applications. This report describes the successful fabrication of several SC fibers using new growth techniques and progress with hybrid fibers which show great promise for nonlinear optical applications. Keywords include: Fiber optics, optical materials, single crystal fibers, evanescent wave coupling, and hybrid fibers.

DESCRIPTORS: (U) *FIBER OPTICS, *NONLINEAR SYSTEMS, *EVANESCENT WAVES, *HYBRID SYSTEMS, CHEMICAL PROPERTIES, COUPLING(INTERACTION), FIBERS, GROWTH(GENERAL), OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OPTICS

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B2

AD-A164 075

AD-A164 070 20/4 13/7
 CALSPAN ADVANCED TECHNOLOGY CENTER BUFFALO NY
 (U) Research on Turbine Flowfield Analysis Methods.
 DESCRIPTIVE NOTE: Final rept. 1 Apr 83-30 Nov 84.
 JAN 85 112P
 PERSONAL AUTHORS: Rae, William J. ;
 REPORT NO. CALSPAN-7177-A-3
 CONTRACT NO. F49620-83-C-0096
 PROJECT NO. 2307
 TASK NO. A1
 MONITOR: AFOSR
 TR-85-1220

UNCLASSIFIED REPORT

ABSTRACT: (U) This report contains a description of conformal-mapping procedures that can be used to generate computational grids for turbomachinery flowfield calculations, and to determine the incompressible potential flow on such a grid. The mapping procedures represent an extension of the Ives transformation to blade rows having a high solidity. The flowfield solution takes advantage of the fact that one of the mapping steps takes the blade row into a unit circle; by writing down the classical source/sink/vortex solution in this circle, it is possible to find the incompressible potential flow in the original cascade. This solution is of interest in its own right, and provides a useful initial condition for iterative or time-marching calculational method. Keywords: Compressors; Grid generation; Transonic flow; Conformal Mapping.

DESCRIPTORS: (U) *TRANSONIC FLOW, *FLOW FIELDS, *TURBOMACHINERY, BLADES, COMPRESSORS, COMPUTATIONS, CONFORMAL MAPPING, INCOMPRESSIBLE FLOW, MAPPING, METHODOLOGY, POTENTIAL FLOW, SOLUTIONS GENERAL, TURBINES, VORTICES, FINITE ELEMENT ANALYSIS, TRANSFORMATIONS(MATHEMATICS)

IDENTIFIERS: (U) Ives transformation, PE61102F,

AD-A164 070

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WUAFOSR2307A1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 068 11/10 7/3

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Hydrolysis of Several Ethylethoxysilanes to Yield
Deformable Filler Particles.

85 5P

PERSONAL AUTHORS: Ning, Y. P.; Rigbi, Z.; Mark, J. E.;

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-1254

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin, n13 p155-
161 1985.

ABSTRACT: (U) A technique is devised for incorporating
organic groups in filler particles, thus giving them some
deformability. Hoped-for increases in toughness were not
obtained, presumably because of replacement of some
surface silanol groups by less reactive organic groups,
thus decreasing filler-matrix bonding and elastomer
reinforcement. Keywords: Filled elastomer; Reinforcement;
Rubber elasticity; Stress-strain behavior; Rupture; and
Toughness.

DESCRIPTORS: (U) *REINFORCING MATERIALS, *SILANES,
*ELASTOMERS, *HYDROLYSIS, FILLERS, PARTICLES, ORGANIC
RADICALS, ELASTIC PROPERTIES, RUBBER, STRESS STRAIN
RELATIONS, DEFORMATION, YIELD, FILLING, REACTIVITIES,
RUPTURE, TOUGHNESS, ETHYL RADICALS, REPRINTS

IDENTIFIERS: (U) Ethylethoxysilanes, PE61102F,
WUAFOSR2303A3

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SRI INTERNATIONAL MENLO PARK CA

(U) Effect of the Interplanetary Magnetic Field Y
Component on the High-Latitude Nightside Convection,

ORIENTATION(DIRECTION), POLAR CAP, CONVECTION, ELECTRIC
FIELDS, IONOSPHERE, PLASMA(Physics), VELOCITY, LINE OF
SIGHT, RADAR, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A3

JUL 85 5P

PERSONAL AUTHORS: La Beaujardiere, O. de ; Wickwar, V. B. ;
Kelly, J. D. ; King, J. H. ;

CONTRACT NO. F49620-83-K-0005, NSF-ATM81-21671

PROJECT NO. 2310

TASK NO. A3

MONITOR: AFOSR
TR 85-1249

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Geophysical Research Letters,
v12 n7 p461 464 Jul 85.

ABSTRACT: (U) Sondrestrom radar observations reveal that
the dawn-dusk (By) component of the interplanetary
magnetic field (IMF) strongly influence the nightside
polar convection. This effect is quite complex. The
convection for one orientation of By is not the mirror
image of the other orientation. A positive By (i.e.,
pointing toward dusk) seems to organize the velocities
such that, at all local times, they are predominantly
westward within the radar field-of-view (approx 68 deg -
to 82 deg invariant latitude). Between dusk and midnight,
on one such occasion, sunward flow is observed within the
polar cap. In the midnight and dawn sectors, when By is
negative, the plasma velocities often appear random. For
large negative By, the afternoon cell appears shifted
toward early hours such that large southward velocities
are observed about 3 hours before midnight. These are the
only times when the predominant velocity component is
southward. Keywords include: Incoherent scatter,
Ionosphere, Magnetosphere, Electric fields, Auroral zone,
and Interplanetary magnetic field.

DESCRIPTORS: (U) *AURORAE, *MAGNETIC FIELDS,
*MAGNETOSPHERE, NIGHT, INCOHERENT SCATTERING, RADAR
REFLECTIONS, TWILIGHT, INTERPLANETARY SPACE.

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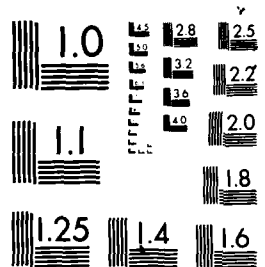
AFOSR TECHNICAL REPORT SUMMARIES APRIL-JUNE 1986(U) AIR 4/4
FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC
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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

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AD-A164 062 CONTINUED

SRI INTERNATIONAL MENLO PARK CA

(U) Thermomechanical Response of Shells with Emphasis on a Conical Shell.

DESCRIPTIVE NOTE: Final rept. 1 Dec 83-30 Nov 84.

DEC 84 114P

PERSONAL AUTHORS: Rubin, M. B. ; Florence, A. L. ;

CONTRACT NO. F49620-84-K-0001

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-85-1239

DESCRIPTORS: (U) *CONICAL BODIES, *SHELLS (STRUCTURAL FORMS), *THERMOMECHANICS, BOUNDARY VALUE PROBLEMS, BOUNDARIES, NONLINEAR SYSTEMS, THEORY, PLATES, RIGIDITY, THERMAL CONDUCTIVITY, CIRCULAR, CYLINDRICAL BODIES, DEFORMATION, SHEAR PROPERTIES, TANGENTS

IDENTIFIERS: (U) Uniqueness theorems, Cosserat surface, PE61102F, WUAFOSR2307B1, LPN-SRI-PYU-6697

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is concerned with the thermomechanical response of shells, with emphasis on a conical shell. Four topics of interest were identified and the results for each of these were written in the form of journal articles and submitted for publication. Topic 1 was concerned with developing a uniqueness theorem for thermoelastic shells that admits generalized boundary conditions. Topic 2 was concerned with developing a nonlinear constrained theory of shells that includes tangential shear deformation. Topic 3 entailed proposing new values for certain constitutive coefficients for shells. Finally, we focused on Topic 4, which was concerned with heat conduction in rigid plates and shells, with emphasis on a conical shell. For each of these topics, we modeled the shell as a Cosserat surface. The conical shell was of particular interest because it has a converging geometry such that the shell near its tip is necessarily 'thick' even though the shell near its base may be 'thin'. To develop confidence in the Cosserat theory for both the thin-shell and thick-shell limits, we considered a number of problems for plates circular cylindrical shells, spherical shells, and a conical shell. It was shown that by appropriately modifying the constitutive equations, it is possible to include enough geometrical features of the shell to predict relatively accurate results even in the thick-shell limit.

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AD-A164 061 8/5 14/2

AD-A164 061 CONTINUED

STANFORD UNIV CA DEPT OF PHYSICS

WUAFOSR2309A1

(U) Development of a Sensitive Superconducting
Accelerometer and Gravity Gradiometer.

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

SEP 84 153P

PERSONAL AUTHORS: Fairbank, William M. ; DeBra, Daniel ;

CONTRACT NO. AFOSR-80-0067

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-1126

UNCLASSIFIED REPORT

ABSTRACT: (U) The inverse square law of gravitation is known to agree with astronomical data to very high accuracy, but recent theoretical and experimental work indicate that the inverse square law may be violated at distances less than 1000 km. Such a violation would signal the existence of a new force. In order to check the inverse square law we are preparing to search for a non-newtonian force in a cylindrical shell. The cylindrical shell has the property that the newtonian effects nearly cancel so that we are doing nearly null experiment. We have developed a superconducting gradiometer to measure the gravitational force gradients at the center of this cylindrical shell. By measuring both the vertical and horizontal gradients we can eliminate effects due to imperfections in the cylinder. This report describes the instrument and its performance as well as calculated of the sensitivity of the inverse square law test.

DESCRIPTORS: (U) *GRAVITATIONAL FIELDS, *GRADIOMETERS, ACCELEROMETERS, ACCURACY, CYLINDRICAL BODIES, GRADIENTS, GRAVITY, HORIZONTAL ORIENTATION, INVERSION, SENSITIVITY, SHELLS (STRUCTURAL FORMS), SUPERCONDUCTORS, VERTICAL ORIENTATION

IDENTIFIERS: (U) Inverse square law, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 059 9/2

AD-A164 059 CONTINUED

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

IDENTIFIERS: (U) *Parallel programming. PE61102F.
WUAFOSR2304A3

(U) High Performance Parallel Computing.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 83.

DEC 85 59P

PERSONAL AUTHORS: Browne, James C. ; Lipovski, G. J. ; Malek, M. ;

CONTRACT NO. F49620-83-C-0049

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-1260

UNCLASSIFIED REPORT

ABSTRACT: (U) The accomplishments of the research project 'High Performance Parallel Computing' for the year 1983 span algorithm formulation, parallel programming languages, basic software for the Texas Reconfigurable Array Computer and validation of design concepts for the Texas Reconfigurable Array Computer (TRAC). Image processing, sorting and time dependent partial differential equations were subjects for algorithm formulation and analysis. Accomplishments in parallel programming include: substantial progress toward the implementation of two parallel programming environments, the Computation Structures Language, and a task level data flow programming system. The hardware prototype of TRAC made substantial progress towards stability. The state-of-the-art in reconfigurable switch based architectures has been advanced. A result of note is the demonstration of the integration of circuit switching and packet switching in a single interconnection network.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *PARALLEL PROCESSING, ALGORITHMS, ARCHITECTURE, ARRAYS, COMPUTATIONS, COMPUTER PROGRAMS, FORMULATIONS, IMAGE PROCESSING, NETWORK FLOWS, REPRINTS, PACKETS, PROGRAMMING LANGUAGES, SWITCHES, SWITCHING CIRCUITS, TEXAS, VALIDATION, STATE OF THE ART

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AD-A164 056 11/4

AD-A164 056 CONTINUED

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND
MATERIALS RESEARCH CENTER

IAC NO. NT-033461

(U) Ultrasonic Nondestructive Evaluation of Damage in
Continuous Fiber Composites.

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

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

IAC SUBJECT TERMS: N--(U)COMPOSITE MATERIALS, FIBER
REINFORCED COMPOSITES, AUTOMATION, DAMAGE, ULTRASONIC
TESTING, VELOCITY, MEASUREMENT, COMPUTERS, CONTROL,
TECHNIQUE, GRAPHITE, EPOXY, PROCEDURES, ACCURACY,
MEASUREMENT, WAVE PROPAGATION;

APR 85 97P

PERSONAL AUTHORS: Kinra, Vikram K. ;

REPORT NO. MM-5024-85-7

CONTRACT NO. AFOSR-84-0066

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR 85-1227

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well known that composite materials
suffer complex damage when they are subjected to either
monotonic or fatigue loading. This damage affects both the
velocity and attenuation of ultrasonic waves. The primary
objective of this research is to correlate the damage
states with the changes in the velocity and attenuation.
Once this has been accomplished the pair of ultrasonic
parameters becomes a measure of the damage. A very
accurate computer-controlled experimental technique to
measure wavespeed in a composite material has been
developed. For conventional isotropic materials
accuracies of two parts per ten thousand were achieved;
for highly damaged Graphite/epoxy composite materials
accuracies of 0.2% have been achieved. Keywords:
Automation; and Fiber reinforced composites.

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES,
*NONDESTRUCTIVE TESTING, *ULTRASONIC TESTS, ACCURACY,
ATTENUATION, COMPOSITE MATERIALS, DAMAGE, ISOTROPISM,
MATERIALS, PARAMETERS, ULTRASONICS, WAVES

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 047 20/4

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) Tabular and Graphical Solutions of Regular and Mach Reflections in Pseudo-Stationary Frozen and Vibrational-Equilibrium Flows. Part 2.

DESCRIPTIVE NOTE: Interim rept..

JUN 85 259P

PERSONAL AUTHORS: Hu, T. C. J.; Shirouzu, M.;

REPORT NO. UTIAS-283-PT-2

CONTRACT NO. DNA001-83-C-0266, AFOSR-82-0096

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-85-1231

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 1, AD-A164 046.

ABSTRACT: (U) Part 2 contains additional graphics for AD-A164 046 and two appendices: Actual Sidewall Pressure Histories and Numerical Results; and Computer-Program Listing for the Analytical Solution of Regular and Mach Reflections.

DESCRIPTORS: (U) *FROZEN EQUILIBRIUM FLOW, *MACH NUMBER, ANALYTIC FUNCTIONS, CANADA, SOLUTIONS(GENERAL), SHOCK WAVES, COMPUTATIONS, GRAPHS, WEDGES

IDENTIFIERS: (U) *Oblique shock wave reflections, *Vibrational equilibrium flow

AD A164 047

AD-A164 046 20/4

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) Tabular and Graphical Solutions of Regular and Mach Reflections in Pseudo-Stationary Frozen and Vibrational-Equilibrium Flows. Part 1.

DESCRIPTIVE NOTE: Interim rept..

JUN 85 259P

PERSONAL AUTHORS: Hu, T. C. J.; Shirouzu, M.;

REPORT NO. UTIAS-283-PT-1

CONTRACT NO. DNA001-83-C-0266, AFOSR-82-0096

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-85-1230

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 2, AD-A164 047.

ABSTRACT: (U) Flow properties of pseudo-stationary oblique-shock-wave reflections are given as solutions of two-shock and three-shock theories. The calculations were performed for Argon, air, Carbon dioxide and sulfur hexafluoride using both frozen and vibrational equilibrium gas assumptions. The flow properties are tabulated for initial shock Mach numbers 1.2 Incident Shock Mach Number < 10.0 and wedge angles 1 deg < actual wedge angle < 85 deg. The flow properties are plotted as a function of the incident shock Mach number for a series of wedge angles for both regular and Mach reflections. Another set of graphs is presented for Mach reflection with the flow properties plotted against the effective wedge angle effective wedge angles for a series of shock Mach numbers. The latter set is used when the effective wedge angle is chosen as the parameter for comparison. The second triple-point system, which exists only in double-Mach reflection, is solved numerically for the first time, and the solutions are presented both in tabular and graphical forms. The tables and graphs are

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AD-A164 046 CONTINUED

designed to serve the analyst and experimenter working on oblique-shock-wave reflections. Keywords: Oblique shock wave reflections; Regular reflection; Mach reflection; Numerical and graphical solutions; Frozen and equilibrium flows. (Canada)

DESCRIPTORS: (U) *SHOCK WAVES, *WAVE PROPAGATION, *GAS FLOW, AIR, ANGLES, ARGON, CANADA, CARBON DIOXIDE, EQUILIBRIUM(GENERAL), FLOW, FLUORIDES, FREEZING, GASES, GRAPHICS, GRAPHS, MACH NUMBER, NUMERICAL ANALYSIS, REFLECTION, SHOCK, SOLUTIONS(GENERAL), SULFUR COMPOUNDS, VIBRATION, WEDGES

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1

AD-A164 022 9/2

KESTREL INST PALO ALTO CA

(U) Knowledge-Based Transformational Synthesis of Efficient Structures for Concurrent Computation.

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

SEP 85 191P

PERSONAL AUTHORS: King, Richard M. ;

REPORT NO. KES.U.85.5

CONTRACT NO. F49620-85-C-0015

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-1259

UNCLASSIFIED REPORT

ABSTRACT: (U) The object of our research is the codification of programming knowledge for the synthesis of concurrent programs. This is important because concurrency is a way of securing better performance on amenable problems than is available on non-concurrent computers. We divide this knowledge into two sections. Knowledge for the synthesis of arrays of processors that could be connected in a geometrically regular manner (crystalline concurrency), and knowledge for the synthesis of tree structure (tree concurrency). We divide synthesis of crystalline concurrency, in turn into several subsections: synthesis of declarations of multiple processors and the wires implied by the dependencies among the values they contain reduction of this wire network to a smaller wire network creation of subnetworks to replace an overly-broad fanout network. virtualization which is the creation of additional array elements and processors to reflect the internal enumerations that comprise the computation of a datum and aggregation which is the merging of several processors into one. We use a transformational approach. The transformational system has rules each of which contains two predicates: an antecedent and a consequent. If the antecedent of a rule is true of a given object, the rule

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AD-A164 022 CONTINUED

applies and the object is modified to make the consequent true. (Author)

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, ARRAYS, MULTIPROCESSORS, NETWORKS, WIRE, CRYSTALS, SYNTHESIS, CODING, TREES

IDENTIFIERS: (U) *Concurrent programming, PE61102F, WUAFOSR2304A2

AD-A164 010 11/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CERAMIC SCIENCE AND ENGINEERING

(U) Tailoring Multiphase Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Jun-30 Sep 85.

DEC 85 21P

PERSONAL AUTHORS: Tressler, Richard E. ; Newnham, Robert E. ;

CONTRACT NO. AFOSR-ISSA-85-00093

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-0003

UNCLASSIFIED REPORT

ABSTRACT: (U) The Tailoring Multiphase Ceramics Conference emphasized the discussion and analysis of the properties of multiphase ceramic materials in which the microstructure is deliberately tailored for specific applications or properties. A number of internationally recognized authorities presented keynote and invited lectures on topics dealing with processing and fabrication of multiphase and composite ceramics, multiphase electroceramics, fiber and whisker reinforced composites, and high temperature multiphase ceramics. The results of recent research were presented in oral and poster sessions by leading researchers from several countries. (Author)

DESCRIPTORS: (U) *CERAMIC MATERIALS, HIGH TEMPERATURE, MICROSTRUCTURE, PHASE, REINFORCING MATERIALS, SYMPOSIA, WHISKER COMPOSITES

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

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AD-A164 009 20/11 22/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Feedforward Control of Waves in Lattice Elements.

DESCRIPTIVE NOTE: Technical rept. 1 Feb-1 Aug 85,

AUG 85 74P

PERSONAL AUTHORS: Williams, James H., Jr.; Norris, Gregory A.; Lee, Samson S.;

CONTRACT NO. F49620-83-C-0092

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-85-1239

UNCLASSIFIED REPORT

ABSTRACT: (U) The motion in a lattice substructural element, within which longitudinal stress waves propagate nondispersively and without attenuation, is assumed to be governed by the classical wave equation. A feedforward controller configuration is proposed to isolate a portion of the substructure from longitudinal wave disturbances. The governing equations for the propagation of incoming and controller-generated stress waves in the substructure are determined. To prevent instability, the controller must respond to incoming stress waves only, disregarding self-generated outgoing waves. The transfer function for the controlled substructure system is derived. The dependence of the transfer function magnitude on the input waveform frequency as well as on controller error parameters is demonstrated. The ranges of acceptable controller error are determined for the operational goals of disturbance cancellation and disturbance amplitude attenuation. Keywords: Wave propagation; Control; Lattice structures; Large space structures.

DESCRIPTORS: (U) *SPACE STATIONS, *VIBRATION, *STRESS WAVES, ATTENUATION, CONTROL, INPUT, WAVEFORMS, SELF OPERATION, WAVES, WAVE EQUATIONS, AMPLITUDE, SPACECRAFT, TRANSFER FUNCTIONS, WAVE PROPAGATION, ERRORS

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B1

AD-A164 009

AD-A164 006 12/1 14/4

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

(U) Reliability Importance for Continuum Structure Functions.

DESCRIPTIVE NOTE: Technical rept.,

85 24P

PERSONAL AUTHORS: Kim, Chul; Baxter, Laurence A.;

CONTRACT NO. AFOSR-84-0243

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0035

UNCLASSIFIED REPORT

ABSTRACT: (U) A continuum structure function is a nondecreasing mapping from the unit hypercube to the unit interval. A definition of the reliability importance, $R(\alpha)$ sub i say, of component i at level α ($0 < \alpha < \text{or } = 1$) is proposed. Some properties of this function are deduced, in particular conditions under which the limit as α approaches 0 of $R(\alpha)$ sub i = the limit as α approaches 1 of $R(\alpha)$ sub i = 0 and conditions under which $R(\alpha)$ sub i is positive ($0 < \alpha < 1$). Keywords: Continuum structure function; Reliability importance; Key vector.

DESCRIPTORS: (U) *MATHEMATICAL ANALYSIS, *RELIABILITY, FUNCTIONS, INTERVALS, CONTINUUM MECHANICS, STRUCTURAL PROPERTIES

IDENTIFIERS: (U) Structure functions, PE61102F, WUAFOSR2304A5

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AD-A164 005 17/2 5/5

AD-A164 005 CONTINUED

INDIANA UNIV AT BLOOMINGTON DEPT OF PSYCHOLOGY
(U) Multi-User Real-Time Speech Processing Facility.

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

MAR 85 12P

PERSONAL AUTHORS: Pisoni, David B. ;

CONTRACT NO. AFOSR-83-0218

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
1R-86-0005

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS,
*HUMAN FACTORS ENGINEERING, *SYNTHESIS, *COGNITION,
*SPEECH, *SPEECH ANALYSIS, ACCELERATION, EAR, FREQUENCY,
HEARING, HUMANS, ISOLATION, NOISE, PERCEPTION, PHONEMES,
POWER SPECTRA, SPEECH, SPEECH ANALYSIS, SYNTHESIS,
SYNTHETIC MATERIALS, WORDS(LANGUAGE)

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4

UNCLASSIFIED REPORT

ABSTRACT: (U) Research projects requiring the VAX 11/750 and related peripherals have all focused on speech analysis, perception and recognition. We compared perceptual confusions occurring for natural and synthetic speech syllables which showed that synthetic speech is not equivalent to noisy or degraded natural speech. We conducted a study that indicated that perception of synthetic speech is improved by training. Training with fluent synthetic sentences improves performance for both isolated words and sentences. Training with isolated words improves performance on isolated words but does not improve performance on fluent synthetic sentences. A large scale series of experiments investigated the effects of noise in a talker's ears on speech production. Words produced in noise are longer, louder and higher in pitch than words produced in the quiet. The tilt of the power spectrum decreased and formant frequencies shifted in noise. Further projects in preparation include detailed acoustic-phonetic and multi-dimensional analyses of speech produced under conditions of noise, stress and acceleration and additional research on perceptual and cognitive constraints imposed on the listener when listening to synthetic speech is continuing as well. Keywords: Speech, synthesis, analysis, perception, recognition, I/O, human factors, cognitive processes, and communication sciences.

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AD-A164 004 20/3 20/1

AD-A164 004 CONTINUED

WISCONSIN UNIV-MADISON DEPT OF PHYSICS

(U) Thin Superconducting Film Characterization by Surface Acoustic Waves.

ALLOYS, MEASUREMENT, DIRECT CURRENT, ELECTRICAL CONDUCTIVITY, IONS, MAGNETIC FIELDS, VERTICAL ORIENTATION, INTERACTIONS, PHONONS, SPINNING(MOTION), ATTENUATION, CRYSTALS, LOW TEMPERATURE, RELAXATION, THIN FILMS

DESCRIPTIVE NOTE: Research progress rept. 30 Sep 84-30 Sep 85.

IDENTIFIERS: (U) PE61102F, WUA0SR230GC1

DEC 85 16P

PERSONAL AUTHORS: Levy, Moises ;

CONTRACT NO. AFOSR-84-0350

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-86-0007

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 a perpendicular magnetic field. At 4.2 K the film appears to have an upper critical field of about 60 K Gauss. Bulk ultrasonic measurements have been made in the series $\text{Er}(1-x)\text{Ho}(x)\text{Rh}_4\text{B}_4$. At 15 MHz a broad peak in attenuation, due to a relaxation mechanism associated with the Ho ions, is observed around 10 K. It moves to lower temperatures as x is decreased. An increase in attenuation is observed in the superconducting state of those alloys which are ferromagnetic superconductors. This increase may be due to superconducting screening of crystalline field effects which inhibit spin phonon interaction in the normal state. Preliminary measurements of the acoustoelectric coupling of SAW with an Al granular film, which is held 15 micron's above the SAW, indicate that at 19 MHz the attenuation increases when the film becomes superconducting. This is an unexpected result since at this frequency the attenuation is expected to decrease when the film becomes superconducting.

DESCRIPTORS (U) *SUPERCONDUCTORS, *FERROMAGNETIC MATERIALS, *SURFACE ACOUSTIC WAVES, *SEMICONDUCTING FILMS.

AD-A164 004

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A164 003 7/4 7/3

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Spectroscopy and Reaction Kinetics of Coordinated Unsaturated Metal Carbonyls.

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

OCT 85 49P

PERSONAL AUTHORS: Weitz, Eric ;

CONTRACT NO. AFOSR-83-0372

PROJECT NO 2306

TASK NO. C4

MONITOR: AFOSR
TR-86-0032

UNCLASSIFIED REPORT

ABSTRACT: (U) A program involving the investigation and characterization of reactions of coordinatively unsaturated organometallic species is described. The program emphasizes the measurement of rates of reaction of photolytically produced coordinatively unsaturated species with the parent and rates for cluster formation. Experimental measurements are performed using a time resolved transient absorption apparatus which uses a line tunable CO laser to record spectral and kinetic information by means of probing absorptions in the CO stretch region of the infrared. Systems that have been investigated include coordinatively unsaturated species generated from the Fe(CO)5, Cr(CO)6 and Mn2(CO)10 parents. The results of experiments with these systems are briefly discussed.

DESCRIPTORS: (U) *METAL CARBONYLS, *REACTION KINETICS, *SPECTROSCOPY, ABSORPTION, CARBON MONOXIDE LASERS, CLUSTERING, KINETICS, ORGANOMETALLIC COMPOUNDS, SPECTRA, TUNABLE LASERS, PHOTOLYSIS, ABSORPTION SPECTRA, IRON COMPOUNDS, CHROMIUM COMPOUNDS, MANGANESE COMPOUNDS

IDENTIFIERS: (U) Unsaturated organic compounds, PE61102F, WUAFOSR2306C4

AD A164 003

AD-A164 002 7/4 7/3

SAN DIEGO STATE UNIV CA DEPT OF CHEMISTRY

(U) Mechanism and Kinetics of the Silane Decomposition in the Presence of Acetylene and in the Presence of Olefins.

85 19P

PERSONAL AUTHORS: Erwin, J. W. ; Ring, M. A. ; O'Neal, H. E. ;

CONTRACT NO. AFOSR-83-0209

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-1252

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Chemical Kinetics, v17 p1067-1083 1985.

ABSTRACT: (U) Kinetic data and product studies are reported for the silane pyrolysis in the presence of olefins and acetylene. The kinetics of silane loss in the presence of acetylene was found to be identical to the initial gas phase silane decomposition step (SiH4 + M yields SiH2 + H2 + M) when corrected for pressure fall-off effects. This result and the absence of methane or ethane from the pyrolysis of SiH4 in the presence of 1-butene or 1-pentene demonstrate that silyl radicals and H atoms are not involved in silane-olefin or silane-acetylene reactions. Qualitative aspects and kinetic data from the SiH4 pyrolysis in the presence of propylene are in accord with propylsilane formation via propylsilylene formed by silylene addition to propylene.

DESCRIPTORS: (U) *SILANES, *PYROLYSIS, *REACTION KINETICS, ACETYLENE, DECOMPOSITION, ETHANES, KINETICS, LOSSES, METHANE, VAPOR PHASES, ALKENES, HYDROCARBONS, PROPENES, REPRINTS

IDENTIFIERS: (U) Olefins, PE61102F, WUAFOSR2303B2

AD A164 002

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVF551

AD-A164 001 7/4

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Assignment of Metal-Nitrogen Stretching Frequencies in Metal Nitrene Complexes.

85 3P

PERSONAL AUTHORS: Osborne, Joseph H. ; Trogler, William C. ;

CONTRACT NO AFOSR-84-0021

PROJECT NO 2303

TASK NO B2

MONITOR AFOSR
TR 85-1256

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v24 n20
p3098-3099 1985

ABSTRACT (U) Isotope labeling ($^{14}\text{N}/^{15}\text{N}$) studies for Cp^*ZrVNFh ($\text{Cp}^* = \text{Eta-C}_5\text{H}_5$), $\text{Ph} = \text{C}_6\text{H}_5$ suggest assignment of the V-N vibrational stretch to a peak at 974 cm^{-1} and the N-C stretch to a peak at 1330 cm^{-1} in the infrared spectra.

DESCRIPTORS (U) *ORGANOMETALLIC COMPOUNDS, *ORGANIC NITROGEN COMPOUNDS, *VIBRATIONAL SPECTRA, TRACER STUDIES, NITROGEN, ISOTOPES, CHEMICAL BONDS, INFRARED SPECTRA, ENERGETIC PROPERTIES, REPRINTS

IDENTIFIERS (U) Stretching frequencies, PE61102F,
WUAFOSP2303B2

AD A164 001

AD-A163 999 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

(U) The Distribution of Maximum Flow with Application to Multi-State Reliability Systems.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 44P

PERSONAL AUTHORS: Fishman, George S. ;

REPORT NO UNC/ORSA/TR-85/8

CONTRACT NO AFOSR-84-0140

PROJECT NO 2304

TASK NO A5

MONITOR AFOSR
TR-85 1257

UNCLASSIFIED REPORT

ABSTRACT (U) This paper describes an efficient Monte Carlo sampling plan for estimating the distribution of maximum flow in a directed network whose arcs have random capacities. Such a network can be used to represent a multistate system whose multistate components are subject to deterioration in capacity by random amounts at random points in time. The proposed sampling plan uses an easily computed a priori upper bound on the complementary distribution function to obtain an unbiased point estimator with smaller variance than crude Monte Carlo sampling allows. The paper also describes procedures for interval estimation and for assessing when the sampling experiment has achieved a specified accuracy. To facilitate sampling, the paper presents a characterization of deterioration based on cumulative processes, leading to the treatment of arc capacities as being multinormally distributed. A technique is described for checking the appropriateness of this model with regard to lower and upper bounds on capacity. A procedure is also described for deriving a confidence interval on the measure used to assess variance reduction. An example illustrates the sampling plan and a concise summary gives all steps needed to implement the plan.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK551

AD-A163 999 CONTINUED

DESCRIPTORS: (U) *NETWORK FLOWS, *MONTE CARLO METHOD, STATISTICAL SAMPLES, DISTRIBUTION FUNCTIONS, SAMPLING, VARIATIONS, ESTIMATES, CONFIDENCE LIMITS, INTERVALS, MULTIMODE, RELIABILITY, REDUCTION

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

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UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF MECHANICAL ENGINEERING

(U) Transient Combustion Dynamics.

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PERSONAL AUTHORS: Choudhury, P. R. ; Gerstein, Melvin ; Mojaradi, Reza ;

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ABSTRACT: (U) Many dump combustors exhibit low frequency longitudinal combustion instability in the frequency range of 80-300 Hz. Although the exact causes of combustion instability are not known precisely, it is generally accepted that the interaction of the shock induced pressure pulsation and the coherent vortex shedding at the dump plane induces combustion instability. During this study a characteristic system frequency associated with sudden expansion steps and a resulting coherent beat phenomenon have been identified. It is also shown that combustion oscillation can occur when the induced forced frequency is approximately equal to the mean of the beat frequency. When the coherence of the shear layer at the dump plane is disrupted either by gasjets or by upstream protrusions the effect of combustion instability is found to be minimized. The control system suggested in this report is based upon the idea of disrupting the shear layer at the dump plane by means of pulsing gasjets. The control system senses the critical combination of frequency, amplitude and phase angle upstream of the combustor and actuates the gasjets at the dump plane at an appropriate combination of frequency, amplitude and phase angle to partially negate the effect of upstream pressure pulsation. Experiments in two laboratory scale dump combustors using premixed

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propane air mixtures show the feasibility of reducing chamber pressure amplitude by such a technique. Keywords: Ramjets.

DESCRIPTORS: (U) *COMBUSTION STABILITY, *COMBUSTORS, *RAMJET ENGINES, AMPLITUDE, ANGLES, BEAT SIGNAL, CHAMBERS, COHERENCE, COMBUSTION, CONTROL SYSTEMS, DYNAMICS, FREQUENCY, LAYERS, OSCILLATION, PHASE, PRESSURE, PULSES, SHEAR PROPERTIES, SHOCK, TRANSIENTS, VORTEX SHEDDING, GAS FLOW, JET FLOW

IDENTIFIERS: (U) Gas jets, PE61102F, WUAFOSR2308A2

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