The AFOSR Technical Report Summaries are published quarterly by the Air Force Office of Scientific Research (AFOSR) 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 for that quarter.
AFOSR

TECHNICAL REPORT SUMMARIES

FOURTH QUARTER 1985
INTRODUCTION

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

1) SUBJECT INDEX
   a. Subject Field
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   a. Primary Author
   b. Title of Report
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PURPOSE

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


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.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.
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AD-A158 559

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

UNCLASSIFIED
DTIC REPORT BIBLIOGRAPHY
AD-P004 940 12/1

RENSSELAER POLYTECHNIC INST TROY NY


FEB 85 23P

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

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

MONITOR: AFOSR

TR-85-0831

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) Component Reports

AD-P004 940

SEARCH CONTROL NO. EVK15N

AD-C037 392L 4/2

IRT CORP MCLEAN VA

(U) TEAL GRANITE.

DESCRIPTIVE NOTE: Final rept. Oct 82-Jun 84.

JUN 84 66P

PERSONAL AUTHORS: Woodall, D. P.

CONTRACT NO. F49620-83-C-0037, ARPA Order-4664

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR

TR-85-0608

SECRET REPORT

DECLASS ON OADR

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Bolling AFB, Washington, DC 20332, 26 Jul 85 or higher DoD authority.

DESCRIPTORS: (U) DUST, VOLCANOES, NUCLEAR EXPLOSIONS, CLOUDS, FALLOUT, MILITARY FACILITIES, MILITARY EQUIPMENT, OPERATION, DUST CLOUDS

AD-C037 392L

UNCLASSIFIED PAGE 1 EVK15N
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-C037 311L 20/7 4/1
MISSION RESEARCH CORP ALBUQUERQUE NM

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

DESCRIPTIVE NOTE: Final rept. ,
JUL 84 63P
PERSONAL AUTHORS: Adler, R. J.; Kluttu, G. F.; Richter-Sand, R. J.;
REPORT NO. AMRC-R-598
CONTRACT NO. F49620-83-C-0128, F29601-83-C-0050
PROJECT NO. 2301
TASK NO. A7
MONITOR: AFOSR
TR-85-0809

SECRET REPORT

DECLASS ON OADR
Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Physics Directorate, Bolling AFB, Attn: XGTD, Washington, DC 20332, 26 Jul 85 or higher DoD authority.

DESCRIPTORS: (U) *ELECTRON BEAMS, *AIR, BETATRONS, HIGH POWER, BEAMS(RADIATION), GROWTH(GENERAL), INTENSITY, PARTICLES, HUMIDITY, ROTATION, FREQUENCY, UNIDIRECTIONAL, CONDUCTIVITY, PROPAGATION, STABILITY, RATES
IDENTIFIERS: (U) *Hose instability, WUAFOSR2301A7, PEB1102F

AD-C037 311L

UNCLASSIFIED REPORT

AD-B095 823L 11/9 19/1
MORTON THIOKOL INC, HUNTSVILLE AL HUNTSVILLE DIV

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

DESCRIPTIVE NOTE: Annual rept. 26 Jun 84-25 Jun 85,
AUG 85 17P
PERSONAL AUTHORS: Graham, W. H.;
REPORT NO. U-85-4544A
CONTRACT NO. F49620-84-C-0059
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR
TR-85-0871

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

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

**DTIC REPORT BIBLIOGRAPHY**

**SEARCH CONTROL NO. EVK15N**

**AD-B095 823L CONTINUED**

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

**IDENTIFIERS:** (U) HTPB (Hydroxy Terminated Polybutadiene), WUAFOSR230282, PE61102F

**AD-A180 616 12/1**

**STANFORD UNIV CA DEPT OF STATISTICS**

(U) Assessing System Reliability Using Censoring Methodology.

**DESCRIPTIVE NOTE:** Technical rept., SEP 85 10P

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

**REPORT NO.** TR-384, AFOSR-TR-85-183

**CONTRACT NO.** N00014-78-C-0475, F49620-85-C-0007

**MONITOR:** AFOSR TR-85-0954

**UNCLASSIFIED REPORT**

**SUPPLEMENTARY NOTE:** Also available as report no. FSU-M11.

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

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

**AD-A180 616**

**UNCLASSIFIED**

**PAGE 3**

**EVK15N**
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A180 598 9/2

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

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

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

JUN 85 10P

PERSONAL AUTHORS: Strait, B. J.

CONTRACT NO. AFOSR-85-0065

PROJECT NO. 2304

MONITOR: AFOSR

TR-85-0875

UNCLASSIFIED REPORT

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

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

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

PE81102F
UNCLASSIFIED

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

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

IDENTIFIERS: (U) *Large numbers, PE81102F, WUAFOSR2304A5

UNCLASSIFIED REPORT

AD-A160 593 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

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

DESCRIPTIVE NOTE: Interim rept.,

OCT 85 22P

PERSONAL AUTHORS: Bal, Z. D.

REPORT NO. TR-84-41

CONTRACT NO. F48620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0859

UNCLASSIFIED REPORT

AD-A160 591 4/1 17/9

UTAH STATE UNIV LOGAN SPACE DYNAMICS LABS

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

DESCRIPTIVE NOTE: Interim rept. Jun 83-Jun 84, 84 31P

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

CONTRACT NO. F48620-83-C-0122

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR

TR-85-0872

UNCLASSIFIED REPORT

AD-A160 593

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

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

AD-A160 591
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

ELECTRONS, NEUTRAL, RADAR SIGNALS

IDENTIFIERS: (U) STATE(Structure and Atmospheric Turbulence Environment), Atmospheric structure, Poker Flat Research Range, PE81102F, WUAFOSR23104A

SEARCH CONTROL NO. EVK15N

AD-A160 516 12/1

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

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

DESCRIPTIVE NOTE: Technical rept., MAY 85 15P

PERSONAL AUTHORS: Karr, A. F.;

REPORT NO. TR-433

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0815

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Euclidean space, Stationary point processes, PE81102F, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 485  7/3
ULTRASYSTEMS INC IRVINE CA
(U) Phospho-s-Triazines. IX. Chloro-Substituted
Monophospho-s-Triazines and Derivatives,
85  13P
PERSONAL AUTHORS: Paciorek, K. J. L.; Nakahara, J. H.;
Smythe, M. E.; Harris, D. H.; Kratzer, R. H.
CONTRACT NO. F49620-79-C-0037
PROJECT NO. 2303
TASK NO.  B2
MONITOR: AFOSR
TR-85-0845

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,

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

DESCRIPTORS: (U)  *AZINES, *PHOSPHORUS COMPOUNDS,
  *SYNTHESIS (CHEMISTRY), AZIDES, CHLORIDES, FRAGMENTATION,
  MASS SPECTRA, PATTERNS, PHOSPHORUS, FLUORINE, ALKYL
  RADICALS, ETHERS, REPLANTS
IDENTIFIERS: (U) Triazines, PEB1102F, WUAFOSR230382

AD-A180 485

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A180 425  20/9  20/3  20/14
TENNESSEE UNIV KNOXVILLE PLASMA SCIENCE LAB
(U) Annual Progress Report on Contract AFOSR-81-0093,
APR 85  273P
PERSONAL AUTHORS: Roth, J. R.
REPORT NO. UTK-PSL-85-3
CONTRACT NO. AFOSR-81-0093
PROJECT NO. 2301
TASK NO.  A8
MONITOR: AFOSR
TR-85-0870

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U)  *PUMPING (ELECTRONICS), *PLASMAS (PHYSICS)
  *RADIOFREQUENCY GENERATORS, BROADBAND ANTENNAS,
  COLLISIONS, ELECTRON DENSITY, EMISSION, EMITTERS, HIGH
  TEMPERATURE, MAGNETIC FIELDS, MEASUREMENT, RADIOFREQUENCY
IDENTIFIERS: (U)  *Penning discharges, WUAFOSR2301A8,
  PEB1102F

AD-A180 425

UNCLASSIFIED

PAGE 7  EVK15N
PITTSBURGH UNIV  PA CENTER FOR MULTIVARIATE ANALYSIS

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

DESCRIPTIVE NOTE: Technical rept.,

NOV 84 17P

PERSONAL AUTHORS: Bai, Z. D.

REPORT NO. TR-84-49

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0813

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

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

IDENTIFIERS: (U) HSU theorem, WUAFOSR2304A5, PE61102F

UNCLASSIFIED REPORT

UNCLASSIFIED

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A180 349 17/9
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

(U) Exact Performance Analysis of the Censored Mean-Level Detector in a Multiple-Target Environment,
JUL 85 34P
PERSONAL AUTHORS: Ritzey, J. A.;
CONTRACT NO. AFOSR-82-0343
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0752

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) CMLD(Censored Mean Level Detectors), Maximum likelihood estimation, Multiple targets, WUAFOSR2304A5, PEG1102F

AD-A180 348 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Optimally Bounded Score Functions for Generalized Linear Models with Applications to Logistic Regression.
DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85.
APR 85 21P
PERSONAL AUTHORS: Stefanski, L. A.; Carroll, R. J.; Ruppert, D.;
CONTRACT NO. F49620-82-C-0009
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0888

UNCLASSIFIED REPORT

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

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

(Author)

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

IDENTIFIERS: (U) Outliers, Robustness, Influential points, WUAFOSR2304A5, PEG1102F
ABSTRACT: (U) During 1984-85 two papers were published. Two were submitted and three are in process. Work in Reliability, Multivariate Analysis and Information Theory continued. Additional keywords: Statistical design criteria; Ideal theory; Nested multidimensional block design; Search decision rules; Cycloidal fields; Probability of correct search. (Author)

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

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N

AD-A160 345  6/16  5/10

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) Biological Investigations of Adaptive Networks.
Neuronal Control of Conditioned Responding.

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

PERSONAL AUTHORS: Moore, J. W.

MAY 85  26P

CONTRACT NO. AFOSR-83-0215

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-85-0746

UNCLASSIFIED REPORT

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

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

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

DESCRIPTORS: (U) Mathematical Analysis, Real Time, Queueing Theory, Reliability(Electronics), Equations, Functional Analysis, Motivation, Methodology, Probability, Reaction Time, Behavior, Transients, Computers, Missions,
ABSTRACT: (U) In characterizing the semistable law, Shimizu reduced the problem into solving an equation where mu and upsilon are given positive measures on infinity. This document obtains a simple proof and shows that some of his conditions can be weakened. Additional keywords: Periodic functions; Random variable. (Author)

ABSTRACT: (U) This project is a multidisciplinary effort between 3 departments and principal investigators. It intends to combine: pattern recognition, image understanding and artificial intelligence techniques for space-based image processing as well as: optical and digital processing methods. Optical feature extraction and sub-pixel target detection and tracking results are summarized. Scene representation and modeling work using probabilistic graph matching, multiple resolution rotation-invariant operators and texture analysis are detailed. Image understanding techniques for 3D scene interpretation discussed include 2D image-level methods (using features such as edges, lines and corners) and 3D scene-level methods. New dynamic programming, stereo image and model building results are included. (Author)
ABSTRACT: (U) The use of preprocessors and decision aids in command, control and communication (C3) systems is meant to reduce the workload of individual decisionmakers and improve the quality of an organization's decisionmaking. An information theoretic framework is used to model the decision aids. Thus, it becomes possible to evaluate quantitatively the effect a decision aid has on the workload of a decisionmaker and to derive necessary conditions that preprocessors (a generic form of decision aids) must satisfy in order that they reduce the human's workload.

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

IDENTIFIERS: (U) Decision aids, Preprocessors, PE61102F, WUAFOSR2304A1

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7
ABSTRACT: (U) The goal of our study was to develop new asymptotic and singular perturbation methods for the analysis of random phenomena, and their application in various areas of science and engineering. We have studied the problems of 1) atomic migration in crystals, 2) ionic and super-ionic conductivity, 3) chemical reaction rates, surface desorption rates, and more general activated rate processes, 4) noise effects on the hysteretic Josephson junction, D.C.-SQUID, and other tunnel junction devices, 5) stability and reliability of randomly loaded elastic structures, 6) relative stability of various multi-stable systems, among others. Considerable success has been achieved, not only in developing new mathematical methods, but in solving a number of problems whose solution has long been outstanding. These include the Kolmogorov Exit Problem and the Kramers nonlinear diffusion problem, among others.

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

DTIC REPORT BIBLIOGRAPHY

AD-A180 322  12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

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

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

JUN 85  55P

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

REPORT NO. TR-105

CONTRACT NO.  F49820-82-C-0009

PROJECT NO.  2304

TASK NO.  A5

MONITOR:  AFOSR

TR-85-0877

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) *Dependence, PEB1102F, WUAFOSR2304A5

SEARCH CONTROL NO.  EVK15N

AD-A180 321  9/5

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Some Comments on the Design of Quantizers.

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

MAY 85  9P

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

CONTRACT NO.  AFOSR-81-0047

PROJECT NO.  2304

TASK NO.  A5

MONITOR:  AFOSR

TR-85-0774

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) Quantizers, PEB1102F, WUAFOSR2304A5

AD-A180 322

AD-A180 321
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 320 9/2 5/1 5/9
CARNegie-MELLon UNIV PITTSBURGH PA ROBOTICS INST
(U) ISIS - A Knowledge-Based System for Factory Scheduling.
DESCRIPTIVE NOTE: Technical rept.
JUL 84 26P
PERSONAL AUTHORS: Fox, M. S.; Smith, S. F.
CONTRACT NO. F49620-82-K-0017
PROJECT NO. 2304
TASK NO. A7
MONITOR: AFOSR
IR-85-0770
UNCLASSIFIED REPORT

UNCLASSIFIED

SUPPLEMENTARY NOTE: Pub. in Expert Systems, v1 n1 p25-49
Jul 84.
ABSTRACT: (U) Analysis of the job shop scheduling domain has indicated that the crux of the scheduling problem is the determination and satisfaction of a large variety of constraints. Schedules are influenced by such diverse and conflicting factors as due date requirements, cost restrictions, production levels, machine capabilities and substitutability, alternative production processes, order characteristics, resource requirements, and resource availability. This paper describes ISIS, a scheduling system capable of incorporating all relevant constraints in the construction of job shop schedules. We examine both the representation of constraints within ISIS, and the manner in which these constraints are used in conducting a constraint-directed search for an acceptable schedule. The important issues relating to the relaxation of constraints are addressed. Finally, the interactive scheduling facilities provided by ISIS are considered.

DESCRIPTORS: (U) SCHEDULING, INDUSTRIAL PLANTS, COMPUTER APPLICATIONS, COSTS, FACILITIES, INTERACTIONS, PRODUCTION, REQUIREMENTS, RESOURCES, AVAILABILITY, SHOPS (WORK AREAS), REPRINTS
IDENTIFIERS: (U) PE11102F, WUAFOSR2304A7
AD-A160 320

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A160 319 12/1
BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING
(U) On Time Delay Estimation Involving Received Signals,
AUG 84 9P
CONTRACT NO. AFOSR-82-0230
PROJECT NO. 2304
TASK NO. A1
MONITOR: AFOSR
TR-85-0778
UNCLASSIFIED REPORT

ABSTRACT: (U) The estimation of time delay between two received signals is reexamined for the three basic approaches to this problem: 1) phase data, 2) generalized cross correlation, and 3) parameter estimation. For a simple delay problem with short data lengths, arguments are presented to refute the claim that the parameter estimation approach is superior to the usual cross-correlation method. Special consideration is given to the more complex problem of estimating the time delay when signals are received through transmitting media with unknown transfer functions. Although the phase data and cross-correlation methods would generally yield biased estimates in this case, it is verified that positivity and monotonicity of the media impulse response functions are sufficient conditions to assure an unbiased cross-correlation estimate when the source signal is a white process. The problem is then reformulated as a parameter estimation problem, and comparison is made with the simpler generalized cross-correlation method using time limited data. (Reprints).

DESCRIPTORS: (U) ESTIMATES, DELAY, TIME INTERVALS, CROSS CORRELATION, CORRELATION TECHNIQUES, FUNCTIONS, MEDIA, PULSES, RESPONSE, APPROACH, PARAMETERS, REPRINTS, LENGTH, SHORT RANGE (TIME), SOURCES, LIMITATIONS, MEDIA.
AD-A160 319

UNCLASSIFIED
AD-A160 319 CONTINUED

TRANSMITTING, TRANSFER FUNCTIONS, BIAS, YIELD

IDENTIFIERS: (U) PE81102F, WUAFS0R2304A1

AD-A160 317 9/4

ARKANSAS UNIV FAYETTEVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Adaptive Hybrid Picture Coding. Volume 2.

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

FEB 85 184P

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

CONTRACT NO. AFOSR-82-0351

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR

TR-85-0922

UNCLASSIFIED REPORT

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

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

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

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

IDENTIFIERS: (U) PEG1102F. WUAFDR230583

AD-A160 317 CONTINUED

ARKANSAS UNIV FAYETTEVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Adaptive Hybrid Picture Coding. Volume 1.

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

FEB 85 179P

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

CONTRACT NO. AFOSR-82-0351

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR

TR-85-0740

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) *Hybrid picture coding, Computer vision,
PEG1102F, WUAFOSR2305B3
A computer powerful model for the stochastic analysis of directed acyclic graphs is developed. These graphs represent event-precedence networks where events may occur serially, probabilistically, or concurrently. When a set of events occurs concurrently, the condition for the set of events to complete is that any specified number of the events must complete. This includes the special cases that one or all of the events complete. The distribution function associated with an event is assumed to have exponential polynomial form. Further generality is obtained by allowing these distributions to have a mass at the origin and/or at infinity. The distribution function for the time taken to complete the entire graph is computed in a semi-symbolic form. Applications of the model for the evaluation of concurrent program execution time and to the reliability analysis of fault-tolerant systems are discussed. Additional keywords: fault trees; nodes; SPADE computer program; SPADE(Series Parallel Directed Acyclic Graph Evaluators).

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

DTIC REPORT BIBLIOGRAPHY

AD-A160 313 CONTINUED

PROCESSES, NETWORKS, NODES

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

AD-A160 311 20/8

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) White Light Optical Information Processing.

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

MAY 85 110P

PERSONAL AUTHORS: Leith, E. N.;

CONTRACT NO. AFOSR-81-0243

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR

TR-85-0853

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1
UNCLASSIFIED

ABSTRACT: (U) Correlation and collective modes have been studied for systems with quite localized valence or conduction bands. In particular this research has been concerned with localized electron-hole states and how they contribute with other excitations to the dynamical response of the system. Important aspects studied have been the effects of exciton or exciton-like states on superconducting properties, electron energy loss spectra and optical spectra. Initially the system studied has been CuCl for which a tight-binding model was used. The results show that strong effects due to localized excitations of d-band electrons greatly affect the dynamical response and the effective electron interaction. Off-diagonal matrix elements of the inverse dielectric citation spectrum, producing exciton resonances in the band gap. The exciton resonance in the dynamical response is necessary to obtain the appropriate attractive effective electron interaction for superconductivity. Models have also been set up to relate the dynamical response including local field effects to the superconducting transition temperature and gap function. The strong localization effects also will affect the loss spectra and optical spectra. Keywords include: Transition metals; Copper; Correlation; Excitons; Dielectric response; Interband excitation; Optical spectra; Energy loss spectra; and Superconductivity.
ABSTRACT: (U) Let \((\theta, X)\) be a \((1, 2, \ldots, s) \times R\) to the \(d\) power-valued random vector and \((\theta_{sub \ 1}, x_{sub \ 1})\) \(\ldots\) \((\theta_{sub \ n}, x_{sub \ n})\) be iid. samples drawn from \((\theta, X)\). The so-called discrimination problem is to find a function of \(X\), usually depending upon \((\theta_{sub \ n}, x_{sub \ n})\) \(\ldots\) \((\theta_{sub \ n}, x_{sub \ n})\), which is used to predict the value of \(\theta\). One of the most frequently used approaches is the nearest neighbor discrimination rule. Keywords: population(mathematics); and random variables.

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

IDENTIFIERS: (U) Nearest neighbor discrimination rule, PE81102F, WUAFOSR2304A5

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

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

IDENTIFIERS: (U) PE85502F, WUAFOSR3005A1
ABSTRACT: (U) In reliability and medical studies, it is often of interest to estimate various quantiles of the unknown lifetime distribution. In particular, the median lifetime and extreme quantiles are of interest to the experimenter in such studies. In many life testing and medical follow-up experiments, however, arbitrarily right-censored data arise, and it is important to be able to estimate the quantiles of interest based on the censored data. For such data, some kernel-type quantile estimators are considered in this paper which give smoother estimates than the usual product-limit quantile function. Keywords: Random right-censorship; Kernel estimation; Product-limit quantile function; Asymptotic normality; and Mean-square convergence.

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

IDENTIFIERS: (U) PE61102F, WUAF0SR2304A5

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

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, *METRIC SYSTEM, DISTRIBUTION, ENTROPY, GEODESICS.
PARAMETERS, PROBABILITY, QUADRATIC EQUATIONS, RANGE(DISTANCE)

IDENTIFIERS: (U) Fisher information matrix, Jensen difference

(U) Hermitian and Nonnegativity Preserving Subspaces.

DESCRIPTIVE NOTE: Technical rept.,

JUL 85 15P

PERSONAL AUTHORS: Mathew, T.;

REPORT NO. TR-85-25

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0751

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

Keywords: Hermitian preserving subspace; symmetry preserving subspace; nonnegativity preserving subspace.

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 288 12/1
DUKE UNIV DURHAM NC
(U) An Aggregation Technique for the Transient Analysis of Stiff Markov Systems.
DESCRIPTIVE NOTE: Interim rept.,
JUL 85
24P
PERSONAL AUTHORS: Trivedi, K. S.
CONTRACT NO. AFOSR-84-0132
PROJECT NO. 2304
TASK NO. K3
MONITOR: AFOSR
TR-85-0744

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U) QUEUEING THEORY, MARKOV PROCESSES, ALGORITHMS, TRANSIENTS, MODELS, RELIABILITY, STIFFNESS
IDENTIFIERS: (U) PEB1102F, WUAFOSR2304K3

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

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

DESCRIPTORS: (U) ESTIMATES, COVARIANCE, MATHEMATICAL MODELS, NORMAL DISTRIBUTION, BIAS, ASYMPTOTIC NORMALITY, ERRORS, MEASUREMENT, LOGISTICS, REGRESSION ANALYSIS, MONTE CARLO METHOD, MAXIMUM LIKELIHOOD ESTIMATION
IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A180 276 7/4

STANFORD UNIV CA DEPT OF CHEMISTRY


MAY 85 14p

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

CONTRACT NO. F49620-83-C-0033

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR

TR-85-0851

UNCLASSIFIED REPORT

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

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

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

AD-A180 278 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A180 278
UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PEB1102F, WUAFOSR2312A1

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A160 273 CONTINUED

IDENTIFIERS: (U) *Analysis of Diversity, Concavity, PE81102F, WJAF0SR2304AS

SEARCH CONTROL NO. EVK15N

AD-A160 271 7/3 8/20 8/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF ZOOLOGY

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

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

JUL 85 14P

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

CONTRACT NO. AFOSR-78-3709

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR

TR-85-0743

UNCLASSIFIED REPORT

ABSTRACT: (U) This final technical report includes a brief summary of research performed, results obtained, graduate students supported and theses written. One paper published was of a technical nature and describes the use of reversephase C-18 minicolumns for concentrating water soluble hydrocarbons derived from JP-4 jet fuel. Another technical paper using the same technique as the first was used to concentrate water soluble hydrocarbons produced by running an outboard motor in water. Analytical methods used for hydrocarbon separation and identification was GC, GC/MS and HPLC. The toxicity of toluene on the fathead minnow was the basis of three papers and a Ph.D. thesis. It was found that the embryo was as sensitive to toluene than was the protolarvae or adult fish. This was determined using 98-hr LC50 tests. An MS thesis was written on the effects of toluene on gill structure in the fathead minnow adult. Little effect of toluene on gill structure was noted. A comparative study on the effects of administration of benzene, toluene and xylene isomerses on their in vitro metabolism and various drug metabolizing enzymes in rat liver, and the covalent binding of toluene to rat liver microsomes has resulted in one Ph.D. thesis and the preparation of three manuscripts for publication. Originator supplied keywords
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 271 CONTINUED

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5

SEARCH CONTROL NO. EVK15N

AD-A160 287 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

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

DESCRIPTIVE NOTE: Technical rept., APR 85 28P

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

REPORT NO. TR-85-12

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0857

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A160 267 CONTINUED

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

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

AD-A160 268 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

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

DESCRIPTIVE NOTE: Technical rept., APR 85 30P

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

REPORT NO. TR-85-09

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

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY

AD-A160 259  9/2  17/2

MASSACHUSETTS UNIV AMHERST DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

JUN 85  9P

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

CONTRACT NO. AFOSR-84-0052

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR

TR-85-0839

UNCLASSIFIED REPORT

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

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

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

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DTIC REPORT BIBLIOGRAPHY

AD-A160 255 12/1
BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

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

84 13P


CONTRACT NO. AFOSR-82-0230

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-85-0780

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE81102F, WUAJOSR2304A1

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVK15N

AD-A160 248 9/2
TEXAS UNIV AT AUSTIN LAB FOR IMAGE AND SIGNAL ANALYSIS


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

JAN 85 31P

PERSONAL AUTHORS: Aggarwal, J. K. ;

CONTRACT NO. F49620-83-K-0013

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR TR-85-0824

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Computer vision, WUAJSOSR2305BC,

AD-A160 248

DEC 83 3P


CONTRACT NO. AFOSR-82-0230, NSF-EC81-11219

PROJECT NO. 2204

TASK NO. A1

MONITOR: AFOSR

TR-85-0779

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) *Target acceleration, WUAFOSR2304A1, PE81102F
ABSTRACT: (U) This project concerns the design and analysis of algorithms to be run in a processor-rich environment. It focuses primarily on algorithms that require no global control and that can be run on systems with only local connections among processors. The properties of these algorithms both theoretically and experimentally are investigated. The experimental work is done on the ZMOB, a working parallel computer operated by the Laboratory for Parallel Computation of the Computer Science Department at the University of Maryland. The emphasis is on two areas: 1) Dense problems from numerical linear algebra; and 2) The iterative and direct solution of sparse linear systems. Additional keywords: parallel algorithms; and software development.

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

IDENTIFIERS: (U) PEG1102F
UNCLASSIFIED

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

DESCRIPTORS: (U) *RECOMBINATION REACTIONS, *REACTION

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY, SEARCH CONTROL NO. EVK15N

AD-A160 235 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

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

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

MAY 85 31P

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

REPORT NO. TR-100

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0631

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

AD-A160 235

UNCLASSIFIED REPORT

AD-A160 234 9/2

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE


DESCRIPTIVE NOTE: Interim rept., MAY 85 8P

PERSONAL AUTHORS: Trivedi, K. S.;

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0783

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

DESCRIPTORS: (U) *FAULT TOLERANT COMPUTING, *MULTIPROCESSORS, COMPUTERS, MODELS, REDUCTION.
SENSITIVITY, SOLUTIONS(GENERAL), CONSTRUCTION, FAULT
TREES, RELIABILITY, MATHEMATICAL MODELS, STOCHASTIC
PROCESSES
IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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

DESCRIPTIVE NOTE: Technical rept.,
MAY 85 14P
PERSONAL AUTHORS: Yin,Y. Q.;Bai,Z. D. ;
REPORT NO. TR-85-17
CONTRACT NO. F49620-85-C-0008
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0881

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 225 12/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

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

MAR 85 10P

PERSONAL AUTHORS: Pearson, A. E.

CONTRACT NO. AFOSR-82-0230

PROJECT NO. 2304

TASK NO. A

MONITOR: AFOSR
TR-85-0781

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Shinbrot method

AD-A180 215 12/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

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

DEC 84 5P

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

CONTRACT NO. AFOSR-82-0230

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0782

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PEB11027, WUAFOSR2304A1

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 214 12/1

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL
SCIENCES

(U) Structural Properties of Randomized Times.

DESCRIPTIVE NOTE: Interim rept.
DEC 84 37P

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

REPORT NO. TR-421
CONTRACT NO. AFOSR-82-0029
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0814

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) PB81102F, WUAFOSR2304A5

AD-A180 213 9/2 9/4 12/1

TEXAS UNIV AT AUSTIN

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

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

MAY 85 7P


CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0775

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) PB81102F, WUAFOSR2304A5

AD-A180 214
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 212 14/4 12/1
NORTHWESTERN UNIV EVANSTON IL

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

DESCRIPTIVE NOTE: Interim progress rept. 1 Jun 83-31 Dec 84.
APR 85 4P
PERSONAL AUTHORS: Cinar, E.

PROJECT NO. 2304

MONITOR: AFOSR TR-85-0828

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

SEARCH CONTROL NO. EVK15N

AD-A160 211 4/2 17/9
CORNELL UNIV ITHACA NY SCHOOL OF ELECTRICAL ENGINEERING

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

DESCRIPTIVE NOTE: Final rept. 1 Mar 83-28 Feb 85
AUG 85 81P
PERSONAL AUTHORS: Farley, D. T.

PROJECT NO. AFOSR-83-0100

TASK NO. A1

MONITOR: AFOSR TR-85-0852

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR2310A1, PE61102F

AD-A160 212 14/4 12/1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 210 12/1

CALIFORNIA UNIV BERKELEY DEPT OF MATHEMATICS

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

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

AUG 85 27P

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

CONTRACT NO. F49620-84-C-0090

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR

TR-85-0795

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Lanczos algorithm, WUAFOSR2304A9, PE81102F

UNCLASSIFIED REPORT

AD-A160 209 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

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

DESCRIPTIVE NOTE: Technical rept.,

NOV 84 25P

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

REPORT NO. TR-84-48

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0817

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

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

IDENTIFIERS: (U) *Random matrices, WUAFOSR2304A5, PE81102F

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 208 12/1
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS
(U) An Application of the Perron-Frobenius Theorem to a Damage Model Problem.
DESCRIPTIVE NOTE: Technical rept., APR 85 14P
PERSONAL AUTHORS: Alzaid, A. A.; Rao, C. R.; Shanbhag, D. N.;
REPORT NO. TR-85-13
CONTRACT NO. F49620-85-C-0008
PROJECT NO. 2304
TASK NO. A3
MONITOR: AFOSR TR-85-0858

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Perron Frobenius theorem, WUAFOSR2304A5, PE81102F

UNCLASSIFIED REPORT

AD-A180 207 12/1
WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES
(U) Numerical Analysis.
DESCRIPTIVE NOTE: Annual rept. 15 Jun 84-14 Jun 85, JUN 85 6P
PERSONAL AUTHORS: Parter, S.;
CONTRACT NO. AFOSR-82-0275
PROJECT NO. 2304
TASK NO. A3
MONITOR: AFOSR TR-85-0783

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) *Multigrid iterative methods, WUAFOSR2304A3, PE81102F
UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 206 9/2

MICHIGAN UNIV ANN ARBOR SUPERCOMPUTER ALGORITHM RESEARCH LAB


DESCRIPTIVE NOTE: Interim rept.

MAR 85 27P

PERSONAL AUTHORS: Calahan, D. A.

REPORT NO. SARL-7

CONTRACT NO. AFOSR-84-0098

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-85-0764

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A180 206.

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

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

IDENTIFIERS: (U) WUAFOSR2304A3, PE81102F

AD-A180 206

SEARCH CONTROL NO. EVK15N

AD-A180 205 9/2

MICHIGAN UNIV ANN ARBOR SUPERCOMPUTER ALGORITHM RESEARCH LAB


DESCRIPTIVE NOTE: Interim rept.

MAR 85 50P

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

REPORT NO. SARL-8

CONTRACT NO. AFOSR-84-0098

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-85-0765

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A180 206.

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

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

IDENTIFIERS: (U) WUAFOSR2304A3, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 204 12/1

RENSES LAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

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

DESCRIPTION NOTE: Interim rept.

APR 85 52P

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

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

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0826

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Quantitative Evaluation of Software Methodology.

DESCRIPTIVE NOTE: Technical rept.,

JUL 85 22P

PERSONAL AUTHORS: Basili, V. R.;

REPORT NO. CS-TR-1519

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

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR

UNCLASSIFIED REPORT

TR-85-0803

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

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

IDENTIFIERS: (U) WUAFOSR2304A2, PE81102F

SEARCH CONTROL NO. EVK15N

AD-A160 198 12/1

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

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

APR 85 18P

PERSONAL AUTHORS: Hall, C. A.;

CONTRACT NO. AFOSR-80-0176

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR

UNCLASSIFIED REPORT

TR-85-0769


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

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

IDENTIFIERS: (U) WUAFOSR2304A3, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 197  7/4  7/2
FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

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

85  9P

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

PROJECT NO.  2303

TASK NO.  A1

MONITOR: AFOSR
TR-85-0846

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytica Chimica Acta, v170

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

(Author)

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

AD-A160 197  7/4  7/2

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EFFECT, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303a1, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 196 12/1
TEXAS UNIV AT AUSTIN
(U) Convergence of Vector Quantizers with Applications to Optimal Quantization.

DESCRIPTIVE NOTE: Rept. for 1 Oct 80-30 Sep 85, FEB 84 9P

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

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0784

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) WAFAOSR2304A5, PEG1102F

AD-A180 196

SEARCH CONTROL NO. EVK15N

AD-A180 192 14/2 20/5 7/4 20/12

AERODYNE RESEARCH INC BILLERICA MA

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

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 84-1 Apr 85, APR 85 34P

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

REPORT NO. A1-RR-489

CONTRACT NO. F49620-84-C-0036

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-85-0810

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the first annual report on a program to develop laser spectroscopic diagnostics for detection of gas phase species important in fabrication processes for advanced semiconductor materials. It has two objectives, to obtain quantitative spectroscopic data for these molecules, and to apply diagnostics to model fabrication systems. This report summarizes progress in the areas of investigation identified in the first year: chlorine atom detection using an infrared tunable diode laser, which will also be used to instrument a plasma etching reactor, and infrared and laser induced fluorescence spectroscopic studies of SF6, CF2, and SiH2. Keywords include: Diagnostic Instrumentation, Electronic Materials, Infrared Absorption, Lasers, Laser-Induced Fluorescence, Microelectronic Fabrication, Semiconductor Processing, and Spectroscopy.


AD-A180 192
UNCLASSIFIED

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

DESCRIPTORS: (U) *STATISTICAL INFEERENCE, COVARIANCE, ESTIMATES, NONPARAMETRIC STATISTICS, OBSERVATION, POISSON DENSITY FUNCTIONS, POISSON EQUATION, SAMPLING, STATIONARY, FUNCTIONS(MATHMATICS)
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

SEARCH CONTROL NO. EVK15N

AD-A160 190 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

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

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85,
APR 85 28P

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

REPORT NO. MMS-1577

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0869

UNCLASSIFIED REPORT

ABSTRACT: (U) There is a substantial literature
concerning linear regression when some of the predictors
(independent variables) are measured with error. Such
models are of importance in econometrics (instrumental
variables models), psychometrics (correction for
attenuation, models of change), and in instrumental
calibration studies in medicine and industry. Recent
theoretical work concerning maximum likelihood estimation
in such models appears in Healy (1980), Fuller (1980),
and Anderson (1984), while Reilly and Patino-Leal (1981)
take a Bayesian approach. In an applied context, an
investigator may either overlook the measurement errors
in the predictors, or choose the classical ordinary least
squares (OLS) estimator of the parameters because of its
familiarity and ease of use. Certainly, the methodology
of classical least squares theory (confidence intervals,
multiple comparisons, tests of hypotheses, residual
analysis) is considerably more developed than the
Corresponding errors-in-variables methodology,
particularly in samples of moderate size. In this paper,
it is shown that under reasonable regularity conditions
such linear combinations are (jointly) asymptotically
normally distributed.
ABSTRACT: (U) Let N(t) be a counting process with continuous compensator A(t) and f(t) a bounded predictable process. If E(exp(2t/N(t))) < infinity and E(exp (2t + exp(f(t)/A(t))) < infinity then it is shown that 2(t) = exp (- integral from 0 to t of (f(u)-A(u)) integral from 0 to t of exp (-f(u)) - t)A(t) is a martingale. This is a partial extension of a theorem of Kabanov, Liptser, Shiryaev (1980) who assumed A(t) < or = but did not assume A(t) is continuous. Keywords: Random variables, Stochastic processes, Poisson processes, convergence.

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

IDENTIFIERS: (U) #Martingales
The Influence of Specific Factors Affecting Spall in Explosively Loaded Soil

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

DTIC REPORT BIBLIOGRAPHY

AD-A160 187 12/1
SYSTMS CONTROL TECHNOLOGY INC PAIO ALTO CA
(U) Adaptive Decentralized Control.
DESCRIPTIVE NOTE: Final rept, Jun 81-Jul 84.
APR 85 126P
PERSONAL AUTHORS: Friedlander, B.
REPORT NO. SCT-5400-03
CONTRACT NO. F49620-81-C-0051
PROJECT NO. 2304
TASK NO. A6
MONITOR: AFOSR
TR-85-0791

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Robust procedures, PE81102F, WUAFOSR2304A8

AD-A160 187

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers X-ray laser development in magnetically confined plasmas, as well as in expanding recombining plasma columns using time resolved soft X-ray monochromators. Experiments with both solid and gas targets resulted in gain measurements for hydrogen-like Carbon (8+) (CVI) ions and population inversion measurements for lithium-like Neon (8+) (NeVIII) ions. Our most recent results, involving carbon disc targets in a 10 kGauss field with a 300 joule carbon dioxide laser pulse, in which a one-pass gain of k1 = 6.5 (enhancement of stimulated emission over spontaneous emission about 100) was obtained for CVI 182A are presented. Results of a gain k1 = 3.0 (k approx. 7.5/cm) for thick carbon fiber targets are also presented. Population inversions of NeVIII ions as a function of initial gas pressure are also discussed, as well as an overview of the instrumentation, experimental setup, and target configurations used. Keywords: X ray laser; XUV laser.

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

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N

AD-A160 188  CONTINUED

NEON, MAGNETIC FIELDS

IDENTIFIERS: (U) X ray lasers, PE81102F, WUAFOSR2301A8

AD-A160 185  12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION
AND DECISION SYSTEMS

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

DESCRIPTIVE NOTE: Interim rept.,
MAR 85 8P

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

REPORT NO. LIDS-P-1445

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

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0833

UNCLASSIFIED REPORT

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

AUTHOR

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 184 12/1
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS
(U) An Extension of Spitzer's Integral Representation Theorem with an Application.
DESCRIPTIVE NOTE: Technical rept., APR 85 13P
PERSONAL AUTHORS: Alzaid, A. A.; Rao, C. R.; Shanbhag, D. N.
REPORT NO. TR-85-11
CONTRACT NO. F49620-85-C-0008
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0858

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Rao rubin condition, Spitzer integral representation, PE81102F, WUAFOSR2304A5

SEARCH CONTROL NO. EVK15N

AD-A160 183 9/2 17/2
ARIZONA UNIV TUCSON
(U) Saguaro: A Distributed Operating System Based on Pools of Servicers.
DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 84, MAR 85 4P
PERSONAL AUTHORS: Andrews, G. R.; Schlichting, R. D.
REPORT NO. TR-84
CONTRACT NO. AFOSR-84-0072
PROJECT NO. 2304
TASK NO. A2
MONITOR: AFOSR
TR-85-0821

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A2

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DTIC REPORT BIBLIOGRAPHY

AD-A180 179 8/7 12/1

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Nonlinear Wave Propagation Study.

DESCRIPTIVE NOTE: Semi-annual technical rept. no. 3, 1
Dec 84-91 May 85,
JUL 85 44P

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

REPORT NO. SC5381.85A

CONTRACT NO. F49620-B3-C-0085, DARPA Order 4400

PROJECT NO. 3A10

MONITOR: AFOSR
TR-85-0792

UNCLASSIFIED REPORT

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

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

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PROPERTIES, AMPLITUDE, NONLINEAR SYSTEMS, WAVE
PROPAGATION, RELAXATION, LOOPS, STRESS STRAIN RELATIONS

IDENTIFIERS: (U) PE62714E
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 178  12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

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

DESCRIPTIVE NOTE: Technical rept.,

MAR 85  25P

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

REPORT NO. TR-85-07

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

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0862

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) *Moving average models; PEG1102F, WUAFOSR2304A5

AD-A160 177  17/2  12/1

STANFORD UNIV CA INFORMATION SYSTEMS LAB

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

JUN 85  6P

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

CONTRACT NO. F49620-79-C-0058

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0762

UNCLASSIFIED REPORT

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

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

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A160 172 CONTINUED
AD-A160 172 20/6
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES
(U) Polarization Properties of the Variable-Grating-Mode Liquid-Crystal Device,
84 4P
PERSONAL AUTHORS: Tanguay, A. R., Jr.; Chavel, P.; Strand, T. C.; Wu, C. S.

CONTRACT NO. AFOSR-83-0185
PROJECT NO. 2305
TASK NO. B1
MONITOR: AFOSR TR-85-0835

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optics Letters, v9 n5 p174-178 May 84.

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

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

IDENTIFIERS: (U) PE61102F, WUAF0SR2304A6

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 166 20/9
FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY
(U) Evaluation of Microwave-Induced Air-Plasma as an Excitation Source.
85 6P
CONTRACT NO. F49620-84-C-0002
PROJECT NO. 2303
TASK NO. A1
MONITOR: AFOSR TR-85-0847

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

AD-A160 167 11/4
FLORIDA UNIV GAINESVILLE DEPT OF ENGINEERING SCIENCES
(U) Internal Material Damping of Polymer Matrix Composites under Off-Axis Loading.
85 15P
CONTRACT NO. AFOSR-83-0154
PROJECT NO. 2303
TASK NO. A3
MONITOR: AFOSR TR-85-0849

UNCLASSIFIED REPORT


ABSTRACT: (U) The objective of this paper is to determine theoretically the material damping of short fibre-reinforced polymer matrix composites. The major damping mechanism in such composites is the viscoelastic behaviour of the polymer matrix. The analysis was carried out by developing a finite-element program which is capable of evaluating the stress and strain distribution of short fibre composites under axial loading. Using the concept of balance of force we can express the modulus E sub x along the loading direction as a function of the mechanical properties of the fibre and matrix materials. The results of this paper can be used to optimize the performance of composite structures. Keywords: stiffening damping. (Reprint)

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

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A160 163 8/11

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION
AND DECISION SYSTEMS

MAR 85 10P

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

CONTACT NO. AFOSR-82-0135

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0778

UNCLASSIFIED REPORT

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

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A160 163 CONTINUED

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

IDENTIFIERS: (U) Inverse problem, PEG1102F, WUAFOSR2304A1

SEARCH CONTROL NO. EVK15N

AD-A160 162 20/8 7/4

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

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

DESCRIPTIVE NOTE: Journal article.

JUL 85 6P

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

REPORT NO. UTRC-926533-5

CONTRACT NO. F49620-83-C-0094

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR

TR-85-0739

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A7
UNCLASSIFIED

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

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 83-3 Mar 85, May 85 107P

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

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

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR TR-85-0753

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U) *SEISMIC WAVES, *DIFFRACTION ANALYSIS,
ADVANCES IN ELECTRICAL PROPULSION TECHNOLOGY HAVE INSPIRED A VARIETY OF APPROACHES FOR ORBIT RAISING PROPULSION. ONE SUCH TECHNIQUE, THE METALLIC INDUCTION REACTION ENGINE, USES A SOLID METALLIC REACTION MASS RATHER THAN A GAS OR PLASMA TO ACHIEVE HIGH THRUST DENSITY AND EFFICIENCY. THE REACTION MASS IS INDUCTIVELY ACCELERATED BY A MAGNETIC PULSE COIL, THEREBY ELIMINATING THE PROBLEMS OF EROSION AND WEAR. THE BASIC MECHANISMS AND LIMITS OF THE CONVERSION OF ELECTRICAL ENERGY INTO KINETIC ENERGY BY THE METALLIC INDUCTION REACTION ENGINE ARE ANALYZED. TO FACILITATE THIS, A SINGLE-SHOT EXPERIMENTAL ENGINE WAS CONSTRUCTED AND OPERATED OVER ONE HUNDRED TIMES, INCLUDING SEVERAL TESTS WITH CONVERSION EFFICIENCIES GREATER THAN 50%. FURTHER ANALYSES WERE PERFORMED BY DEVELOPING A NUMERICAL MODEL. THE VELOCITY AND CURRENT PREDICTED BY THIS MODEL AGREED TO WITHIN 15% OF THE EXPERIMENTAL DATA OVER THE ENTIRE RANGE OF OPERATION. EXTRAPOLATION TO HIGHER PERFORMANCE OPERATION HAS REVEALED THAT THERE ARE ADVERSE COUPLING EFFECTS AND CIRCUIT IMPEDANCE EFFECTS WHICH CAN LIMIT THE ULTIMATE PERFORMANCE OF THE METALLIC INDUCTION REACTION ENGINE.
ABSTRACT: (U) This study compares the results of code reading, functional testing, and structural testing in three aspects of software testing: fault detection effectiveness, fault detection cost, and classes of faults detected. Thirty-two professional programmers and 42 advanced students applied the three techniques to four unit-sized programs in a fractional experimental design. The major results of this study are the following. (1) With the professional programmers, code reading detected more software faults and had a higher detection rate than did functional or structural testing, while functional testing detected more faults than did structural testing, but functional and structural testing were not different in fault detection rate. (2) In one advanced student subject group, code reading and functional testing were not different in faults found, but were superior to structural testing, while in the other advanced student subject group there was no difference among the techniques. (3) With the advanced student subjects, the three techniques were not different in fault detection rate. (4) Number of faults observed, fault detection rate, and total effort in detection depended on the type of software tested. (5) Code reading detected more interface faults than did the other methods. (6) Functional testing detected no control than did the other methods. (7) When asked to estimate the percentage of faults detected, code readers gave the most accurate estimates while functional testers gave the least accurate estimates. Appendix B includes the source code for the word.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 135 AD-A160 135 CONTINUED

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
RESEARCH

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

DESCRIPTIVE NOTE: Technical rept.,

MAY 85 21P

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

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

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

PROJECT NO. 2304

TASK NO. K2

MONITOR: AFOSR

TR-85-0822

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-EC84-
04399.

ABSTRACT: (U) Fast parallel algorithms are presented for
updating connected components and bridges of an
undirected graph when a minor change has been made to the
graph, such as addition or deletion of vertices and edges.
The 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 \( C(n^2) \) processors. These algorithms are
efficient when compared to previously known algorithms
for finding connected components and bridges that require
\( O(\log \sqrt{n}) \) time and use \( O(n) \) processors.
The previous solution is maintained using an inverted
tree (a rooted tree where a node points toward its parent)
and after a minor change the new solution is rapidly
computed from this tree.

DESCRIPTORS: (U) *ALGORITHMS, *GRAPHS, PARALLEL
PROCESSING, INVERSION, TREES, SOLUTIONS(GENERAL), BRIDGES,
MEMORY DEVICES, POSITION(LOCATION), RANDOM ACCESS
COMPUTER STORAGE
A. Poisson-Stability as a Unifying Factor for Max-Stability and Sum-Stability.

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

**DESCRIPTORS:** (U) *Points (Mathematics), Stability, Integration, Multivariate Analysis, Poisson Density Functions, Random Variables, Stochastic Processes, Vector Analysis*

**IDENTIFIERS:** (U) WUAFOSR2304A5, PE81102F

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

DTIC REPORT BIBLIOGRAPHY

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present in the matrix.

CATALOG CARD

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

IDENTIFIERS: (U) Van Der Walls Forces, WUAFOSR230381, PE81102F

SEARCH CONTROL NO. EVK15N

AD-A160 130 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS


DESCRIPTIVE NOTE: Technical rept., MAY 85 19P

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

REPORT NO. TR-85-16

CONTRACT NO. F49B20-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0880

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F
UNCLASSIFIED

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

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

IDENTIFIERS: (U) WUAFOSR2304K2, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 126 12/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

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

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

OCT 85 12P

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

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0794

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 119 9/2

MASSACHUSETTS UNIV AMHERST DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

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

JAN 85 13P

PERSONAL AUTHORS: Pradhan, D. K.;

CONTRACT NO. AFOSR-84-0052

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0840

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Computers, v34 n1 p33-45 Jan 85.

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

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

IDENTIFIERS: (U) Data buses, PE81102F, WUAFOSR2304A5

AD-A160 119

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A160 108 12/1

TEXAS UNIV AT AUSTIN

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

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

APR 85 4P

PERSONAL AUTHORS: Wise, G. L.;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0790

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters,
v5 n5 p355-356 Apr 85.

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

DESCRIPTORS: (U) *ESTIMATES, ERRORS, REPRINTS

IDENTIFIERS: (U) Minimum mean squared error estimation,
WUAFOSR2304A5, PE81102F

AD-A160 108

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

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

DESCRIPTORS: (U) *MAPPING, *OPERATORS(MATHEMATICS),
COVARIANCE, MATRICES(MATHEMATICS), ESTIMATES, FILTERS,
CLASSIFICATION, OPERATORS(PERSONNEL), PHYSICAL PROPERTIES,
VIBRATION, BOUNDARIES, DISPLACEMENT, ALGORITHMS.
A Simple Approximation for Minimum Mean-Square Error Symmetric Uniform Quantization.

Descriptive Note: Rept. for 1 Oct 80-30 Sep 83.

Personal Authors: Lu, F. S.; Wise, G. L.

Contract No.: AFOSR-81-0047

Project No.: 2304

Task No.: A5

Monitor: AFOSR

TR-85-0785

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

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

Descriptors: (U) *ANALOG TO DIGITAL CONVERTERS.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 091  20/13

RENSSELAER OBSERVATORY  TROY N Y

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

85 24P

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

CONTRACT NO. AFOSR-81-0172, DE-AT03-A2ER12097

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-85-0842

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) Chaos, Van Der Waals Forces, Spinodal decomposition. PE81102F, WUAFOSR2304A1

UNCLASSIFIED REPORT

SEARCH CONTROL NO  EVK15N

AD-A160 087  9/4  12/1

TEXAS UNIV AT AUSTIN

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

MAR 84 6P


CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0788

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5
UNCLASSIFIED

UNCLASSIFIED REPORT

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

ABSTRACT: (U) The time-resolved behavior of see-phenethyl, cumyl, and diphenylmethyl radicals as radical pairs solubilized in micelles has been observed using pulsed laser photolysis. The decay of the micellized radical pairs consists of a fast component (20-2000 X 000000001/sm attributed to reaction within the germinate pair, and a slow component (2000 X 000000001/sm) attributed to react ions from random encounters of radicals. The extent of germinate pair reaction (micellar cage reaction) depends upon the competition between that rate constants for reaction and diffusive separation. The rate constants for the reaction and diffusive processes are determined and the nature of these processes is discussed. A correlation is found between the extent of fast decay observed in the time-resolved experiments and the extent of cage reaction determined from steady-state photolysis. Originator supplied keywords include: magnetic field effects: time-resolved photochemistry.

DESCRIPTORS: (U) *CHEMICAL RADICALS, *PHOTOLYSIS, COLLOIDS, CONSTANTS, DECAY, DIFFUSION, DYNAMICS, IONS, MAGNETIC FIELDS, MAGNETIC PROPERTIES, PHOTOCHEMICAL REACTIONS, PULSED LASERS, RATES, STEADY STATE, TIME, Methyl radicals, phenyl radicals, reaction kinetics, reprints

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 074  12/1

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

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

85  16P

PERSONAL AUTHORS: Parter, S. V.;

CONTRACT NO. AFOSR-82-0275

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR

TR-85-0798

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A3

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SEARCH CONTROL NO. EVK15N

AD-A160 073  9/4  12/1

TEXAS UNIV AT AUSTIN

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

NOV 84  5P


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

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0788

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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

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

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

IDENTIFIERS: (U) Liapounov matrix equations, PE81102F, WUAF05R2304A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 069 12/1 9/4 9/3

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Multidimensional Maximum Entropy Covariance Extension,
MAR 85 5P

PERSONAL AUTHORS: Lev-Ari, H.

CONTRACT NO. AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-85-0757

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) PEB1102F, WJAFOSR2304A8

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A180 067 12/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

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

DESCRIPTIVE NOTE: Scientific rept.,
SEP 84 15P

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

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

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

UNCLASSIFIED REPORT

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

ABSTRACT: (U) In this reprint an efficient exact-least-
squares procedure is presented specifically for the
adaptive adjustment of a fractionally spaced equalizer
(FSE). The intersymbol interpolation of the desired
lattice least-squares algorithms of Falconer and Ljung and in comparison to the Lin-Proakis
simplification for multichannel versions of the fast-
lattice least-squares algorithms of S.P. Stoica and Pack. Substantial reductions in computational and storage
requirements are also achieved by the new procedure
through the elimination of the inversion of p x p
matrices in these multichannel versions. Additional
reductions in computational requirements are achieved by
a special exact-least-squares modification for the
passband Nyquist FSE structure of Mueller and Werner. The
procedure is shown to be most efficiently implemented
using a transversal-filter realization of the fast exact-
least-squares algorithms. The per-iteration and per-unit-time computational requirements of the new procedure (T/4
FSE) are found to be approximately the same as those of
the more conventional, but much slower converging (T/2)
tap-leakage stochastic-gradient algorithms of Gitlin, Meadors, and Weinstein. Finally, simulations are conducted to verify the operation of the new procedure for both the training and decision-directed modes of operation. Additional keywords: Kalman filtering. (Author) DESCRIPTORS: (U) *LEAST SQUARES METHOD, COMPARISON, MULTICHANNEL, COMPUTATIONS, REQUIREMENTS, INTERPOLATION, INTERSYMBOL INTERFERENCE, TAPS, SEQUENCES, TRAINING, REQUIREMENTS, STORAGE, DATA RATE, SYMBOLS, KALMAN FILTERING, STARTING, TIME, CONVERGENCE, REPRINTS IDENTIFIERS: (U) Fractionally spaced equalizer
(U) A Generalized Block Truncation Coding Algorithm for Image Compression,

JUN 84 7P


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

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0788

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

(Author)

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

AD-A180 051
In this paper, an algorithm is developed for the realization of any stable, passive digital rational transfer function in a cascaded interconnection of similar processors with only nearest neighbor links. Extremely high throughput rates are shown to be achievable since the realization yields a pipelineable architecture. By appropriately choosing some normalization constants, limit cycle and overflow oscillations can also be eliminated. Experimental evidence is presented to show the low sensitivity of the structure with respect to perturbations of its parameters. The realization algorithm is extremely simple to implement, particularly for Butterworth, Chebyshev, and Elliptic Selective Filters. The procedure presented here is an outgrowth of certain results in stochastic estimation theory, involving in particular, the so-called fast Schur algorithm for lattice filters. Keywords include: orthogonal digital filters; VLSI; and pipelineable architecture. (Reprints).

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A180 049 12/1
STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING
On Beamforming in Presence of Multipath,
MAR 85 5P
PERSONAL AUTHORS: Pautaj, A.; Kailath, T.
CONTRACT NO. DAAG29-81-K-0057, AFOSR-83-0228
PROJECT NO. 2304
TASK NO. A6
MONITOR: AFOSR
TR-85-0758

UNCLASSIFIED REPORT

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

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

Keywords: beamforming; radiated signal; wavefront correlation; array covariance; and reprints.

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

IDENTIFIERS: (U) WUAFOSR2304AL, PE81102F

AD-A180 048 12/1
TEXAS UNIV AT AUSTIN
DEC 84 5P
PERSONAL AUTHORS: Abaya, E. F.; Wise, G. L.
CONTRACT NO. AFOSR-81-0047
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0789

UNCLASSIFIED REPORT


ABSTRACT: (U) Necessary and sufficient conditions are given for the existence of optimal k-dimensional quantizers that minimize distortion measure \(E(M(X)C(-Q(X)))\). An example is given in which a globally optimal quantizer does not exist. Additional keywords: Statistical analysis; Communication theory; Data reduction; Optimal quantization; Error based cost functions; Reprints. (Author)

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, COMMUNICATION AND RADIO SYSTEMS, THEORY, COSTS, ERRORS, FUNCTIONS, OPTIMIZATION, QUANTIZATION, DATA REDUCTION, REPRINTS

IDENTIFIERS: (U) *Quantizers, WUAFOSR2304A5, PE81102F

AD-A180 049
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A160 027 17/3
STANFORD UNIV CA INFORMATION SYSTEMS LAB
(U) Direction of Arrival Estimation of Eigenstructure Methods with Unknown Sensor Gain and Phase.
MAR 85 5P
CONTRACT NO. F49620-79-C-0058
PROJECT NO. 2304
TASK NO. A6
MONITOR: AFOSR TR-85-0758

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8

AD-A160 026 17/3
STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING
DEC 84 8P
PERSONAL AUTHORS: Paulraj, A.; Shan, T. J.; Kallath, T.;
CONTRACT NO. AFOSR-83-0228
PROJECT NO. 2304
TASK NO. A6
MONITOR: AFOSR TR-85-0758

UNCLASSIFIED REPORT

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

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

(Supplements)

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8

AD-A180 027

AD-A180 026
ABSTRACT: (U) This thesis reports on a series of experimental studies performed to determine possible uses of objective software measurements in characterizing and evaluating software. This work revolves around two main themes. The first theme addresses the usefulness of metrics in evaluating the quality of software, particularly as it is related to the errors or changes required during development. It also contains information about how different programming techniques and individual programmers affect the analysis. The second theme addresses program modularity from the perspective of objective software measurements. A technique for automatically determining a hierarchy of modules for a system given its procedure interfaces is presented and evaluated on some class projects and some medium size production software.

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

IDENTIFIERS: (U) WUAFOSR2304A2, PEB1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A160 011 20/9

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Fundamental Processes in Partially Ionized Plasmas.

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

MAR 85 62P

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

CONTRACT NO. AFOSR-83-0108

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR

TR-85-0811

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A159 972 12/1
CALIFORNIA UNIV LOS ANGELES DEPT OF SYSTEM SCIENCE
(U) Approximate Stabilizability via the Algebraic Riccati Equation.

DESCRIPTIVE NOTE: Rept. for 21 Oct 81-4 Mar 84.
JAN 85 9P
PERSONAL AUTHORS: Levav, M.
CONTRACT NO. AFOSR-79-0053
PROJECT NO. 2304
TASK NO. A8
MONITOR: AFOSR TR-85-0825

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) Semigroups(Mathematics), PE81102F, WUAFOSR2304A8

SEARCH CONTROL NO. EVK15N

AD-A159 971 9/4 12/1
TEXAS A AND M UNIV COLLEGE STATION

DESCRIPTIVE NOTE: Rept. for 1 Oct 80-30 Sept 85.
MAR 84 4P
PERSONAL AUTHORS: Halverson, D. R.; Wise, G. L.
CONTRACT NO. AFOSR-81-0047
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR TR-85-0787

UNCLASSIFIED REPORT


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


IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8
UNCLASSIFIED REPORT

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

ABSTRACT: (U) The H2CO A1A2 electronic state is among the first for which photophysical and photochemical processes have been examined at the level of individual rovibronic eigenstates. Of primary importance are the mechanisms responsible for the collision-induced and collision-free decay of specific rotation-vibration levels. This Communication reports the use of a new technique, Transient Gain Spectroscopy (TGS), as a probe of collision-induced processes in H2CO A superscript 1 A sub 2 A superscript 1. The results provide the first direct experimental evidence that the curvature in Stern-Volmer plots of undispersed fluorescence data is due to collisional transfer of population from the initially prepared S sub 1 rovibronic level to adjacent levels having radically different collision-free lifetimes. We have shown the utility of Transient Gain Spectroscopy in a system where unimolecular nonradiative processes compete with radiative and collisional depopulation processes. The limitation imposed by the restricted tunability (approximately 7 GHz) of the argon ion probe beam was recently eliminated by using a cw dye laser, with polarization detection, as a probe of A state dynamics. In a related experiment, utilizing SEIR with two pulsed lasers and a cw polarization probe, we have measured the collisional depopulation rates of specific rotation-vibration levels, having approximately 1200/cm of vibrational excitation, in the H2CO A subscript 1 A sub 1 state. Originator supplied keywords include: Laser Spectroscopy, Formaldehyde, Rotational Energy Transfer.

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

IDENTIFIERS: (U) PE61102F, WUA AD-159 970 CONTINUED
**Abstract:** (U) Composites of satellite imagery are constructed for various hours and various summer months on Colorado State University's interactive processing system. Simple averages of visible wavelength imagery are considered as well as averages of bispectrally classified data. The classified images use both visible wavelength and infrared wavelength data to identify probable deep convection. Results reveal the diurnal convective cycle over the Rocky Mountains and high plains in greater detail than has been previously possible. The convective frequency composites are compared with precipitation averages and differences between normal versus severe weather patterns are discussed. Practical forecasting applications for the compositied data are suggested and discussed. (Author)

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

**Identifiers:** (U) PE81102F, WUAOFDR2310A1

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

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

DTIC REPORT BIBLIOGRAPHY

ACOUSTIC VELOCITY, PROFILES

IDENTIFIERS: (U) Inverse problems, PE81102F.
WUAFOSR2304A1

(ILLINOIS UNIV AT CHICAGO CIRCLE)

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

DEC 84

4P

PERSONAL AUTHORS: El-Newehi, E.

CONTRACT NO. AFOSR-80-0170

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR

TR-85-0806

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

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

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

IDENTIFIERS: (U) IFRA (Increasing Failure Rate Average),
NBU (NEW Better Than Used), Increasing sets, PE81102F,
WUAFOSR2304K3
UNCLASSIFIED DTIC REPORT BIBLIOGRAPHY

AD-A159 402 17/2 12/1
MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS
DESCRIPTION NOTE: Annual rept. no. 11, 15 May 84-14 May 85.
JUN 85 3P
PERSONAL AUTHORS: Rosenkrantz, W. A.;
CONTRACT NO. AFOSR-82-0187
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR TR-85-0715

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSSR2304A5, PE81102F

AD-A159 396 7/4
UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT
(U) Vibrational Excitation of Li2(X 1 Sigma(+)) sub g state via Electron or Photon Excitation of the A 1 Sigma(+) sub u and B 1 Pi sub u States.
MAR 85 5P
REPORT NO. UTRC/926533-4
CONTRACT NO. F49620-83-C-0094
PROJECT NO. 2301
TASK NO. A7
MONITOR: AFOSR TR-85-0647

UNCLASSIFIED REPORT

ABSTRACT: (U) Cross sections for vibrational excitation (VE) of the X 1 Sigma (+) sub g state of Li2 via formation of the excited A 1 Sigma (+) sub u or B 1 Pi sub u electronic states are reported. For VE through the A 1 Sigma (+) sub u state, the cross sections are nearly constant for forming X 1 Sigma (+) sub g (3 approx. < nu approx. < 9) via electron collisional excitation. For photon pumping (600 approx. < lambda approx. < 700 nm) of the A 1 Sigma (+) sub u state, levels nu < or = 9 are predominantly formed. VE via the B 1 Pi sub u state has a lower probability.

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

IDENTIFIERS: (U) WUAFOSSR2301A7, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A159 394 9/1 20/3 17/9

MISSION RESEARCH CORP ALBUQUERQUE NM

(U) Millimeter Wave Vircator.

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

JUN 85 272P

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

REPORT NO. AMRC-R-692

CONTRACT NO. F49620-82-C-0014

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-85-0668

UNCLASSIFIED REPORT

ABSTRACT: (U) Te millimeter wave vircator as achieved a frequency in excess of 39.9 GHz and a peak power of the order of 21 kilowatts (f > or = 26.35 GHz) for a pulse duration of as short as 5 ns full width at half maximum. A new moderate voltage, high current density, field emission gun has been tested to a voltage, high current density, field emission gun as been tested to a voltage of 87 kV and an inferred current density of 7 kA/mer sq cm. A new compact capacitive voltage monitor, similar to those commonly used in radar modulators, has been developed for short pulse, fast risetime, low to moderate impedance pulse lines. Keywords include: Virtual cathode, Virtual anode; Virtual cathode oscillator; VIRCATOR; Space-charge limit; Space-charge limiting current; Millimeter microwaves; and Spectrometer.

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

IDENTIFIERS: (U) PEB1102F, WUA0SR2301A8

AD-A159 394

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this effort is to develop realistic algorithms for matrix computations on parallel computers. It has been long observed that the usual algorithms of numerical linear algebra contain a great deal of inherent parallelism. For example, if the arithmetic operations that can be performed in parallel in Gaussian elimination are actually so executed, the time to decompose an n x n matrix is reduced from cu n to n on an arbitrarily connected network of computers, has it become feasible to exploit this parallelism on anything but a trivial scale there is under development a parallel system, called ZM08, consisting of 256 micro-processors connected on a conveyor belt. This belt is so fast and its architecture is such that any two processors can communicate without interfering with the communications of other pairs of processors. Thus the ZM08 is an ideal tool for simulating an arbitrarily connected network of computers. This feature of the ZM08 is particularly useful in investigating parallel matrix algorithms. As was noted above, there is much parallelism in most current matrix algorithms. However, to exploit it, information must be moved from processor to processor. This constitutes the chief bottleneck in parallel matrix algorithms; interconnections between processors are expensive, and in a practical system one can assume only a limited amount of connectivity. The ZM08 provides a means of testing and assessing the performance of such algorithms.

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

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

IDENTIFIERS: (U) PE61102F

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Probability, 
v21 n4 p810-825 Dec 84.

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

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

IDENTIFIERS: (U) *Pure jump damage process, *Devices, 
life distributions, PE61102F, WUAF05R2304A5
In the context of three problems involving time series: the estimation of integrals of random quantities, the estimation of regression coefficients, and the detection of signals in noise, we search for optimal sampling designs of a given sample size and for asymptotically optimal designs. We consider deterministic designs, such as periodic, regular and midpoint sampling, as well as random ones, such as simple random and stratified sampling. We also use either optimal estimators and sufficient statistics, or much simpler estimators and statistics. (Author)

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

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

IDENTIFIERS: (U) PE1102F, WUAFOSR2304A2
ABSTRACT: (U) Work during the past year was conducted on yttria-doped hot-pressed silicon nitride, alpha-silicon carbide, and a glass-bonded aluminum oxide. The first two materials were selected for study because of their potential for high temperature structural application, whereas the latter material was selected as a model material to investigate the creep-rupture behavior of two phase ceramics. During the past year our work emphasized the microstructural analysis of these materials and the effect of microstructure on component lifetime. A study has also been started on the effect of microstructure on component lifetime. A study has also been started on the effect of temperature on the strength of a commercial grade of partially stabilized zirconium oxide. The brief summary presented below gives our major findings on each of these materials. Full papers for each study are included in this report. (Author)

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

IDENTIFIERS: (U) PE61102F, WUA828R2306A2, LPN-NBS-
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 198 CONTINUED

AD-A159 198

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

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

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85, JUN 85 218P

PERSONAL AUTHORS: Christensen, S. K.

REPORT NO. TR-104

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0705

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A159 189 9/2

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

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

DESCRIPTIVE NOTE: Final rept. 14 Jun 81-15 Jun 85, Jul 85 174P

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

CONTRACT NO. AFOSR-81-0205

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR

TR-85-0732

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PE80112F, WUAFOSR2304A2


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

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

IDENTIFIERS: (U) Levy wear process, PE81102F, WUAFOSR2304A5

AD-A159 182 12/1

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

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

NOV 84 11P

PERSONAL AUTHORS: Abdel-Hameed, M.;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0710

UNCLASSIFIED REPORT

AD-A159 189
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 181  12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

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

DESCRIPTIVE NOTE: Technical rept. 1 Sep 84-31 Aug 85,
JUN 85  195P

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

REPORT NO. TR-107

CONTRACT NO. F49620-82-C-0009

PROJECT NO.  2304

TASK NO.  A5

MONITOR: AFOSR
  TR-85-0704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis,

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

DTIC REPORT BIBLIOGRAPHY

AD-A159 180  12/1

NORTH CAROLINA UNIVERSITY AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

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

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

JUN 85  17P

PERSONAL AUTHORS: Ramasubramanian, S.

REPORT NO. TR-108

CONTRACT NO. F49620-82-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0703

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Submartingales, PE81102F, WUAFOSR2304A5

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UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A159 170  11/2

ROCKWELL INTERNATIONAL THOUSAND OAKS, CA SCIENCE CENTER

(U) Strengthening and Strength Uniformity of Structural Ceramics.

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

APR 85  110P

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

REPORT NO. SC5295.4FR

CONTRACT NO. F49620-81-C-0036

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR

TR-85-0731

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of a four year study aimed at improving the strength and reliability of structural ceramics are summarized. Strength-degrading flaw populations were identified and processing methods were developed to eliminate each flaw population, thereby increasing the strength of Al2O3-ZrO2 composites by a factor of three. The final year's work, which is reported in detail here, concentrated on the introduction of beneficial surface stresses by grinding. Identification of strength-controlling characteristics of transformation toughened ceramics, and manipulation of microstructure by controlling grain growth. Requirements for inhibition of grain growth by several phase particles (particle size, volume fraction) were identified and grain-size control in transformation toughened materials was achieved by sintering in a two-phase field. (Author)

DESCRIPTORS: (U) CERAMIC MATERIALS, CONTROL, DEFECTS (MATERIALS), GRAIN GROWTH, GRAIN SIZE, GRINDING, INHIBITION, METHODOLOGY, PARTICLE SIZE, PROCESSING, RELIABILITY, SINTERING, STRESSES, STRUCTURES, SURFACES, TWO PHASE FLOW, STRENGTH (MECHANICS), ALUMINUM OXIDES, ZIRCONIUM OXIDES

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 170 CONTINUED

IDENTIFIERS: (U) PE81102F, WUAFOSR2306A2

AD-A159 168 12/1

WASHINGTON STATE UNIV PULLMAN

(U) Rapidly Convergent Algorithms for Nonsmooth Optimization.

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

JUL 85 6P

PERSONAL AUTHORS: Mifflin, R.

 contract no. AFOSR-83-0210

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR

TR-85-0713

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Nondifferential programming
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 165 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

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

DESCRIPTIVE NOTE: Technical rept.,
MAR 85 20P
PERSONAL AUTHORS: Miamee, A. G.;
REPORT NO. TR-96
CONTRACT NO. F49620-82-C-0009
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0682

UNCLASSIFIED REPORT

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

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

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

AD-A159 163
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS


DESCRIPTIVE NOTE: Technical rept.,
JUL 85 38P
PERSONAL AUTHORS: Baiq, M; Lincheng, Z;
REPORT NO. TR-8526
CONTRACT NO. F49620-85-C-0008
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0698

UNCLASSIFIED REPORT

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

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

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

AD-A159 163

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

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

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

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

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

IDENTIFIERS: (U) *Shock models, Life distributions, Optimal replacement. WUAFOSR2304A5, PE81102F

IDENTIFIERS: (U) *Grid generation techniques, Elliptic generating equations, PE81102F, WUAFOSR2304A3
ABSTRACT: (U) A previously developed technique has been used to describe the discrete scattering of scalar waves from defects on a regular simple cubic lattice. The method makes no assumption about the symmetry of the scatterers and therefore can be applied to inhomogeneities of arbitrary shape. The only limitation of the technique is the maximum number of defects one can use to specify the scatter, which in turn is determined by limitations in computation time. The multiple scattering model proposed by Foldy and later extended by Lax was implemented by West and Shlesinger as a means of evaluating the distribution of grains in polycrystalline materials. If the material consists of grains such that the wavelength is much larger than the grain size then the density of scatterers probed by the acoustic wave is unchanged as the frequency is increased, provided that one remains in the Rayleigh scattering domain. If one is in the scattering domain where the wavelength is less than or equal to the grain size, then the density of scatterers increases no more rapidly than the square of the linear scale (a-squared) rather than as its cube as it would in the usual situation. This implies that the density of scatterers is a fractal in the stochastic scattering domain. Note also that the surface of a grain can have many scales and may in part be responsible for the fractal behavior observed in the phenomenological expression. Keywords: Scattering theory, The Fractal Dimension of Ultrasonic Scatters.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 145  12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) A Note on N Estimators for the Binomial Distribution,
JUN 85  5P

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

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0699

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of the American

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

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

IDENTIFIERS: (U) *Binomial distributions, MUAFOSR2304A5,
PGB11027

UNCLASSIFIED REPORT

AD-A159 138  12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

(U) Extreme Value Theory and Dependence.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85,
JUL 85  8P

PERSONAL AUTHORS: Leadbetter, M. R.;

REPORT NO. TR-109

CONTRACT NO. F49620-82-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0692

ABSTRACT: (U) The purpose of this paper is to give a
very brief account of some of the essential ideas
underlying classical extreme value theory, and to see how
these are used (modified as necessary) for dependent
cases. In particular it will be shown how the classical
theory still applies for moderately dependent stationary
sequences, but that under higher local dependence,
clustering of high values occurs, requiring modifications
of the theory especially as it involves order statistics
other than the maximum. Underlying concepts (especially
point process convergence results) are emphasized.
Additional keywords: Stochastic processes; Random
variables. (Author)

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

IDENTIFIERS: (U) PGB1102F, MUAFOSR2304A5
ABSTRACT: (U) Fast algorithms for solving large-scale structural optimization and least squares problems are being investigated. An especially significant aspect of this work is the development and testing of parallel algorithms for alternatives to the often ill-conditioned stiffness equations approach in structural analysis on machines such as the Cray X-MP, the Denelcor HEP and the Intel Hypercube. The principal thrusts in this project on least squares methods have been in developing techniques for the solution of superlarge problems in a stable way, i.e., employing orthogonal factorization techniques, on multiprocessors. These computations involve various levels of parallelism, including domain decomposition as well as pipelining type schemes for orthogonal factorization. Additional keywords: linear algebra; parallel processing. (Author)

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3
estimators that have been proposed in the literature will be indicated and briefly discussed in Section 3. These include maximum likelihood estimators, kernel type estimators, Bayesian estimators, and histogram estimators. Due to their computational simplicity and other properties, the kernel-type hazard rate estimators will be emphasized. Results of Tanner (1983) and Tanner and Wong (1983, 1984) will be presented in Section 4 while the estimator considered by McNichols and Padgett (1981) will be discussed in Section 5.

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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

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

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

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

IDENTIFIERS: (U) Lisp programming language, *Expert systems, Automobiles, WUAFOSR2917A5, PE61102F, LPN-OSURF-763725/715560
# DTIC REPORT BIBLIOGRAPHY

**AD-A159 124**  
9/1 20/12 9/5  
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB  
(U) Lucky-Electron Model of Channel Hot-Electron Injection in MOSFET's.  
SEP 84 11P  
CONTRACT NO. F49620-79-C-0178, N00039-81-K-0251  
PROJECT NO. 2305  
TASK NO. A9  
MONITOR: AFOSR TR-85-0657  

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**AD-A159 122**  
20/6 9/5  
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES  
OCT 84 53P  
CONTRACT NO. AFOSR-80-0037  
PROJECT NO. 2305  
TASK NO. B1  
MONITOR: AFOSR TR-85-0659  

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**AD-A159 124**  
Lucky-Electron Model of Channel Hot-Electron Injection in n-channel MOSFET's.  
This model is compared with measurements from the literature for n-channel MOSFET's and good agreement is achieved. In the process, new values for the physical parameters such as hot-electron scattering mean-free-path, impact ionization energy, and substrate current that this model suggests. (Author)  

**AD-A159 122**  
The design of chirped grating lenses on optical waveguides for opto-electronic signal processing is presented in this report. Fundamental limitations of the performance of chirped grating lenses due to material properties, fabrication tolerance and design parameters are discussed. In addition, absorption and electro-refraction properties in GaAs and InP semiconductors are presented. Cross modulation of optical radiations at two different wavelengths has been observed in GaAs. It has the potential of exhibiting optical AND logic. Keywords include: Chirped grating; waveguide lens; opto-electronic signal processing; and electro-refraction III-V compound opto-electronic devices.  

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**AD-A159 124**  
Lucky electrons, hot electrons, CHEI (Channel Hot Electron Injection), WUAFOSR2305A9, P61102F  

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**AD-A159 122**  
Lucky-electron concept is successfully applied to the modeling of channel hot-electron injection in n-channel MOSFET's. This results in a relatively simple expression that can quantitatively predict channel hot-electron injection current in MOSFET's. The model is compared with measurements from the literature for n-channel MOSFET's and good agreement is achieved. In the process, new values for the physical parameters such as hot-electron scattering mean-free-path, impact ionization energy, and substrate current that this model suggests. (Author)  

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**AD-A159 122**  
WUAFOSR230581, P61102F  

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**UNCLASSIFIED**  
SEARCH CONTROL NO. EVK15N  

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**UNCLASSIFIED**  

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

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

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**UNCLASSIFIED**  
IDENTIFIERS: (U) WUAFOSR230581, P61102F  

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**UNCLASSIFIED**  
AD-A159 122  
PAGE 111 EVK15N
The Event Related Brain Potential as an Index of Information Processing, Cognitive Activity, and Skill Acquisition: A Program of Basic Research.

DESCRIPTION: Final report: 1 Sep 83-31 Aug 84,

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

REPORT NO.: CPL-85-1

CONTRACT NO.: F49620-83-C-0144

PROJECT NO.: 2313

TASK NO.: A4

MONITOR: AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We review a program of research designed to understand the event-related brain potential (ERP) so that it can be used as a tool in the study of cognitive function and in the assessment of man-machine systems. We have conducted a series of studies on the functional significance of ERPs and have demonstrated that the P300 component is related to memory processes. We have used measures of the same component to evaluate workload, to time mental processes, to study the reciprocity of processing resources, and to extend theories of human information processing. We have also made technical advances in the analysis of the distribution of electrical potentials across the scalp. Keywords: Event-related brain potential (ERP); P300; Memory; Mental chronometry; Information processing; Workload; Automatic versus controlled processing; Resource reciprocity; Dual tasks vector filters.

DESCRIPTORS: (U) COGNITION, INFORMATION PROCESSING, MAN MACHINE SYSTEMS, CONTROL, INDEXES, MEMORY (PSYCHOLOGY), HEAD (ANATOMY), MENTAL ABILITY, BRAIN, HUMANS, INFORMATION PROCESSING, ACQUISITION, FILTERS, WORKLOAD, ELECTROENCEPHALOGRAPHY, PSYCHOPHYSIOLOGY, AUTOMATIC.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 108 12/1

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

(U) Unified Method for Delay Analysis of Random Multiple
Access Algorithms.

DESCRIPTIVE NOTE: Interim rept.,

AUG 85 63P

PERSONAL AUTHORS: Georgiadis, L.; Merakos, L.; Papantoni-Kazakos, P.

REPORT NO. UCT/DEECS/TR-85-8

PROJECT NO. TR-85-0712

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper presents a unified method for
the delay analysis of a large class of random multiple-access algorithms. This method is based on a powerful
theorem referring to regenerative processes, in conjunction with results from the theory of infinite
dimensionality linear systems. The method is applied to analyze and compute the per packet expected delays
incurred by three algorithms, in the presence of the Poisson user model. The considered algorithms are: The
controlled ALOHA algorithm, the 0.487 algorithm, and the
n-ary stack algorithm. Additional keywords:
Communications networks; Markovian models; Throughput; Delay. (Author).

DESCRIPTORS: (U) *ALGORITHMS, *MULTIPLE ACCESS, *RANDOM
ACCESS COMPUTER STORAGE, COMPUTATIONS, MATHEMATICAL
MODELS, THROUGHPUT, DELAY, LINEAR SYSTEMS, MODELS,
POISSON DENSITY FUNCTION, USER NEEDS, COMMUNICATIONS
NETWORKS, MARKOV PROCESSES

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Optical Society
of America A, v2 n5 p674-682 May 85.

ABSTRACT: (U) Cumulative distributions of the number of
photoelectrons ejected during a fixed interval can be
computed by numerical contour integration in the complex
plane when the light incident upon the detector is a
combination of coherent light and incoherent background
light with arbitrary spectral density. The integrand
involves the probability-generating function of the
distribution, and a method for computing it in terms of
the solution of a certain integral equation is described.
The method is related to those for the estimation of a
stochastic process in the presence of white noise. An
approximation valid for large values of the time-
bandwidth product is also described. (Author)

DESCRIPTORS: (U) *COUNTING METHODS, *PHOTOELECTRONS,
NUMERICAL INTEGRATION, COMPUTATIONS, CONTOURS, STOCHASTIC
PROCESSES, WHITE NOISE, REPRINTS

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

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UNCLASSIFIED PAGE 113 EVK15N
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DTIC REPORT BIBLIOGRAPHY
AD-A159 104 CONTINUED

LIMITS, INTERVALS, MEASUREMENT, INSTRUMENTATION,
PRECISION, SLOPE, STATISTICAL PROCESSES, VARIABLES,
STANDARD DEVIATION, DOCUMENTS, STATISTICS

IDENTIFIERS: (U) Confidence intervals, Precision
instruments, Small errors, WJUNRO42544, WUAFOSR2304A8,
PBG1102F

SEARCH CONTROL NO. EVK15N
AD-A159 101 20/4 12/1

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATERIALS
ENGINEERING

(U) Early Transonic Ideas in the Light of Later
Developments.

DESCRIPTIVE NOTE: Technical rept.,
AUG 85 42P

PERSONAL AUTHORS: Cole, J. D.;

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-85-0694

UNCLASSIFIED REPORT

ABSTRACT: (U) A survey is given of early ideas about
transonic flow and their current interpretation.

DESCRIPTORS: (U) TRANSONIC FLOW, AERODYNAMICS, THEORY,
MATHEMATICAL MODELS, NUMERICAL METHODS AND PROCEDURES,
SHOCK WAVES, DRAG, HISTORY, TRANSONIC WIND TUNNELS

IDENTIFIERS: (U) Supercritical flow, TSD(Transonic Small
Disturbances), WUAF05R2304A4, PEG1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N

AD-A159 100  12/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Basic Research in Reliability for Real Systems.

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

JUL 85  6P

PERSONAL AUTHORS: LI, V. O. K.;

CONTRACT NO.  AFOSR-84-0269

PROJECT NO.  2304

TASK NO.  K3

MONITOR:  AFOSR

TR-85-0711

UNCLASSIFIED REPORT

ABSTRACT: (U) The Event-Based Reliability Model (EBRM) was developed to model and analyze the reliability of a network in which component failures are statistically dependent. In EBRM, the events that could cause component failures were modeled explicitly. This approach had the great advantage that it required much less parameters than the traditional model employing conditional probabilities. The EBRM was also proved to be a completely general model which could be applied to any kind of failure dependencies. For reliability evaluations, many existing algorithms for computing network reliability could be used with minor modifications and no significant increase in computational complexity. An improved algorithm for the appropriate evaluation of network performance was also developed. For multi-state systems, ordered enumeration was used to approximate and bound system reliabilities and other performance measures, and an efficient algorithm was developed for this purpose.

(Author)

DESCRIPTIONS: (U) RELIABILITY, MATHEMATICAL MODELS, NETWORK ANALYSIS(MANAGEMENT), ALGORITHMS, COMPUTATIONS, MULTIMODE, NETWORKS, PARTS, TEST AND EVALUATION

IDENTIFIERS: (U) Event based reliability model.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 098  8/18
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Differential Equations for Neuronal Behavior.

DESCRIPTIVE NOTE: Technical rept.,

JUN 85 44P

PERSONAL AUTHORS: Christensen, S. K.; Kallianpur, G.

REPORT NO. TR-103

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0706

UNCLASSIFIED REPORT

ABSTRACT: (U) This article extends the recent work of Kallianpur and Wolpert modeling the behavior of neurons by means of stochastic partial differential equations on the dual of a nuclear space. The extensions will cover nuclear spaces of a more general structure and will apply to models described in terms of more general differential operators. A second objective of this article is to present a theoretical framework which will include the model recently proposed and heuristically investigated by Wan and Tuckwell. The authors illustrate their approach and its application by giving a rigorous treatment of the Wan and Tuckwell model. But first they briefly describe the neurophysiological context. Additional keywords: Voltage potential; Weak convergence; Mathematical models; Theorems. (Author)

DESCRIPTORS: (U) *NERVE CELLS, *DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, BEHAVIOR, MATHEMATICAL MODELS, VOLTAGE, OPERATORS(MATHEMATICS), WEAK CONVERGENCE

IDENTIFIERS: (U) PEG1102F

AD-A159 099
UNCLASSIFIED DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 079 20/5

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Coupled High Power Waveguide Laser Research.

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-31 May 85. JUL 85 64P


REPORT NO. UTRC/R85-926869

CONTRACT NO. F49620-84-C-0062

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-85-0734

UNCLASSIFIED REPORT

ABSTRACT: (U) The United Technologies Research Center (UTRC) conducted a research program to explore a unique ridged waveguide technique to phase-lock an array of coupled CO2 waveguide lasers. The motivation for this investigation was scale the output power capability of CO2 waveguide lasers by one to two orders of magnitude greater than the present state-of-the-art (i.e., scale to power levels of 100 W to 1 kW) while maintaining single frequency operation. A one year program was conducted to test the feasibility of the ridged waveguide coupling technique. The feasibility study clearly produced positive results. In particular, stable phase-locked operation of two and three-channel arrays was demonstrated at the 50 W level. Phase-locking was maintained in a laboratory environment for many hours without adjustments other than length tuning of the laser. In addition, a first-order theory was developed to strengthen the understanding of the coupled waveguide laser array. (Author)

DESCRIPTORS: (U) COUPLING, INTERACTION, WAVEGUIDES, LASERS, PHASE LOCKED SYSTEMS, ENVIRONMENTS, LABORATORIES, LENGTH, TUNING, OUTPUT, POWER, OPERATION, STABILITY, THEORY, MOTIVATION, POWER LEVELS, FREQUENCY.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 078 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Strong Representation of Weak Convergence.

DESCRIPTION NOTE: Technical rept.,

JUL 85 40P

PERSONAL AUTHORS: Bai, Z. D.; Liang, W. Q.;

REPORT NO. TR-85-29

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0683

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well known that there is a big difference between the concepts of weak and strong convergence of random variables. In the area of limiting theory, it is of interest to study the difference as well as the link between the two concepts of convergence. Additional keywords: Skorokhod's theorem; finite dimension case; Eigenvalues; Random matrices.

DESCRIPTION: (U) *RANDOM VARIABLES, *WEAK CONVERGENCE, CONVERGENCE, EIGENVALUES, MATRICES(MATHEMATICS)

IDENTIFIERS: (U) Skorokhod's theorem, PE61102F,

WUAF05R2304A5

UNCLASSIFIED REPORT


ABSTRACT: (U) The process of determining acuities from visual evoked responses (VER's) was computer modeled. Based on amplitude variability data from earlier studies, the reliability and validity of the acuity determinations for normal subjects were assessed. For subjects who had poor quality VER data (low signal-to-noise (S/N) ratios), considerable variability and an artifactual shift toward elevated (better) acuity determinations were found. Key words: visual evoked response (VER), visual evoked potential, acuity, noise, reliability, steady-state.

DESCRIPTION: (U) *VISUAL ACUITY, AMPLITUDE, LOW RATE, RELIABILITY, SIGNAL TO NOISE RATIO, COMPUTERIZED SIMULATION, MODELS, RESPONSE(BIOLOGY), REPRINTS

IDENTIFIERS: (U) *Visual evoked response, PE61102F,

WUAF05R2313D9

AD-A159 078

UNCLASSIFIED

AD-A159 075
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 072 8/1 8/5

CALIFORNIA UNIV SAN FRANCISCO

(U) Evidence for the Macromolecular Basis of Regulation of Heart Hypertrophy,

84 7p

PERSONAL AUTHORS: Jackowski, G.; Kun, E.

CONTRACT NO. F48620-81-C-0007

PROJECT NO. 2312

TASK NO. AF

MONITOR: AFOSR

TR-85-0593

UNCLASSIFIED REPORT


ABSTRACT: (U) In vivo treatment of rats with triiodothyronine (0.3 micrograms per g body wt for four consecutive days) increases both poly(ADP-ribose) polymerase activity and DNA synthesis in myocardial nuclei obtained from 18-21-days-old rats. The same T3 treatment in 30-33-days-old rats inhibits poly(ADP-ribose) polymerase activity and simultaneously increases RNA synthesis in myocardial nuclei. A correlation was observed between the degree of inhibition of poly(ADP-ribose) polymerase and ventricular enlargement in triiodothyronine treated animals. RNA synthesis in isolated myocardial nuclei was inhibited by the in vitro poly ADP-ribosylated proteins were isolated from myocardial nuclei by the SDS-phenol extraction. More than 90% of the protein-poly ADP-ribose adducts partitioned into the aqueous phase behaving as if they were nucleic acids. Treatment with triiodothyronine significantly diminished poly ADP-ribosylation of three specific groups of poly ADP-ribosylated non-histone chromatin proteins corresponding to 130 kDa, 90-80 kDa and 80-65 kDa.

DESCRIPTORS: (U) *HEART, *CARDIOVASCULAR DISEASES, *ADENOSINE, *MACROMOLECULES, *RIBOSE, CONTROL, THERAPY, IN VIVO ANALYSIS, RATS, POLYMERS, REPRINTS
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 067 12/1
BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING
(U) Control and Identification of Time Varying Systems.

DESCRIPTIVE NOTE: Annual technical rept. 30 Jun 84-29 Jun 85,
JUL 85 9P
PERSONAL AUTHORS: Pearson, A. E.;
CONTRACT NO. AFOSR-82-0230
PROJECT NO. 2304
TASK NO. A1
MONITOR: AFOSR
TR-85-0890

UNCLASSIFIED REPORT

ABSTRACT: (U) Research is summarized for a projected integral equation error technique used in the parameter identification of differential-delay equation models, including the time delay estimation problem for received signals. Current research on a fresh look at the Shinbrot method of moment functionals is described relating to the modeling and identification of linear, bilinear and polynomial input-output differential systems. Current research is also described for the feedback stabilization of state delayed control systems using a reducing transformation technique. (Author)

DESCRIPTORS: (U) *ERROR ANALYSIS, *MATHEMATICAL MODELS, DELAY, ESTIMATES, FEEDBACK, IDENTIFICATION, PARAMETERS, STABILIZATION, TIME, TIME INTERVALS, INTEGRAL EQUATIONS, DIFFERENTIAL EQUATIONS, TRANSFORMATIONS(MATHEMATICS)

IDENTIFIERS: (U) *Time varying systems, WUAFOSR2304A1, PE81102F

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UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of the research proposed was to define the subcellular site(s) or target(s) of action of the aromatic hydrocarbon toluene. Confirmed target sites were then to be investigated in detail to elucidate possible mechanisms of toluene action in perturbing membrane structure that might be related to either an enhancement or loss in membrane functions. Under this problem, several test systems developed in our laboratory for toxicological evaluation of target sites of membrane active substances were employed. The basic approach was to subject each tissue to a graded series of toluene concentrations for varying periods of time after which the material was prepared for electron microscopy under conditions developed to yield accurate and reproducible evaluations. Comparisons were made between identical tissues treated in a similar fashion in the absence of toluene. Gross and subtle morphological changes were noted indicative of an activity target using the following three test systems: Primary Rat Hepatocytes in Culture, Cultured BHK, KB and L Cells, Outer Cap Cells of the Maize Root Tip.

DESCRIPTORS: (U) *TOLUENES, *TOXICOLOGY, AROMATIC COMPOUNDS, CELLS(BIOLOGY), ELECTRON MICROSCOPY, FUNCTIONS, HYDROCARBONS, INTERACTIONS, LIVER, RATS, REPRODUCIBILITY, TIME INTERVALS, MEMBRANES(BIOLOGY), TISSUES(BIOLOGY),

AD-A159 067

UNCLASSIFIED PAGE 121 EVK15N
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY
SEARCH CONTROL NO. EVK15N

AD-A159 065 CONTINUED

NDFROPHOLOGY (BIOLOGY), CELL STRUCTURE, DYSFUNCTION, SITES,
TEST AND EVALUATION, MEMBRANES, TARGETS

IDENTIFIERS: (U) WUAFOSR2312A5, PEB1102F

AD-A159 069 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Inadmissibility of the Best Equiavariant Estimators of
the Variance-Covariance Matrix and the Generalized
Variance under Entropy Loss.

DESCRIPTIVE NOTE: Technical rept.,
JUL 85 22P

PERSONAL AUTHORS: Sinha, B. K.; Ghosh, M.

REPORT NO. TR-85-27

CONTRACT NO. F49620-85-C-0008, NSF-DMS82-18191

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0688

UNCLASSIFIED REPORT

ABSTRACT: (U) Based on a data matrix and an independent
Wishart matrix testmators dominating the best
equivariant estimators of sigma and /sigma/ are obtained
under two types of entropy loss. For simultaneous
estimation of the mean vector and the variance covariance
matrix of a multinormal population, a suitable entropy
loss is developed and testmators dominating the pair
consisting of the sample mean vector and the best
multiple of the sample Wishart matrix are derived. A
technique of SINHA is heavily exploited. Keywords: MANOVA
test; Roy's maximum root test; Wishart distribution.

DESCRIPTORS: (U) #WISHART MATRICES, #ESTIMATES, DATA
BASES, ENTROPY, DISTRIBUTION, COVARIANCE, ANALYSIS OF
VARIANCE, POPULATION (MATHEMATICS)

IDENTIFIERS: (U) Roys maximum root test, WUAFOSR2304A5,
PEB1102F

AD-A159 065

AD-A159 059

UNCLASSIFIED

PAGE 122 EVK15N
ABSTRACT: (U) All three military services are developing automated human performance measurement systems for aviation training devices and research on human performance. The purpose of this study was to create a set of aircrew-system performance measurement guidelines for research based on a review of current practice, and the measurement experience and technical judgement of the investigators. A subjective analysis of common measurement requirements among flight tasks for all phases of military aviation was conducted. The selection of system state variables would be dictated by the individual research problem, but guidelines for sampling, measure segmentation, and selection of transforms to create measurement were developed for common flight tasks and measurement problems. Performance measurement issues in system design, training, and automated performance measurement system design were discussed. FORTRAN program listings for common transforms and specialized multivariate data analyses for selecting and constructing measurement from empirical data were appended. Use of the illustrated techniques was recommended, as was the need to update these techniques as measurement experience accrues. Keywords: Performance Measurement, Segmentation Logic, Transformations.

DESCRIPTORS: (U) *MEASUREMENT, *FLIGHT SIMULATORS.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 054  20/12  20/8

GTE LABS INC WALTHAM MA

(U) High Speed, Low Power Non-Linear Optical Signal Processing in Semiconductors.

DESCRIPTIVE NOTE: Annual rept. 28 May 84-25 May 85.

JUL 85  11P

PERSONAL AUTHORS: Dagenais, M.

CONTRACT NO. F49620-84-C-0052

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR

TR-85-0735

UNCLASSIFIED REPORT

ABSTRACT: (U) In the first year, significant advances were made in realizing the goals of this proposal. The lowest single beam switching (<8 ps) and the fastest reported ON/OFF switching (<1 ns) bistable device with clearly resolved states was demonstrated using the nonlinearity associated with bound excitons in CdS. The role of thermal effects in transient measurements done on the nanosecond time scale near free excitons was investigated theoretically. Thermal effects on the millisecond and microsecond time scales were experimentally studied. In particular, self-pulsation of the transmitted beam and intra-cavity optical bistability due to optically induced changes in absorption and refraction were investigated. Large degenerate four-wave mixing signals were observed near free and bound excitons in CdS at cryogenic temperatures. Four-wave mixing measurements at higher temperatures are now in progress.

(Author)

DESCRIPTORS: (U) *SWITCHING, *EXCITONS, *MICROSECOND TIME, *NONLINEAR SYSTEMS, ABSORPTION, CRYOGENICS, HIGH TEMPERATURE, HIGH VELOCITY, LOW TEMPERATURE, MEASUREMENT, SCALE, SWITCHING, THERMAL PROPERTIES, TRANSIENTS, EXCITONS, MICROSECOND TIME, NONLINEAR SYSTEMS, THERMAL PROPERTIES
**ABSTRACT:** (U) This report presents the results of the investigations conducted over a period of four years on control algorithms designed for stochastic systems. The main feature of these algorithms is that they account for: 1) the current uncertainty in the system; and 2) the anticipated future uncertainty in the system, which is in general control-dependent. The first feature leads to the control to have the cautious property in order to minimize the effect of the current uncertainties of the system's performance. The second feature allows the control to affect in addition to the system's state also the system's uncertainty. Such a controller is called a dual controller because, by taking advantage of its dual effect has the capability of reducing the future uncertainties. These uncertainties can pertain to the system's state or its unknown parameters. Both continuous-valued and discrete-valued uncertainties have been considered.

**KEYWORDS:** (U) *Adaptive Control Systems, Stochastic Control, Algorithms, Control, Estimates, Stochastic Processes*

**IDENTIFIERS:** (U) PE81102F, WUAF05R2304A1

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**ABSTRACT:** (U) This research program is concerned with the long-term consequences of prolonged elevation of acetylcholine on cholinergic and non-cholinergic transmission in hippocampal synapses and the mechanisms through which any such effects might be achieved. Progress has been made in three areas: (1) a cholinergically mediated physiological response has been identified in the in vitro hippocampal slice, (2) the response of the hippocampus to repeated applications of cholinergic agonists has been found to be relatively constant, particularly when compared to that elicited by activation of two types of receptors for adic acid acids, and (3) the stimulation of a potentially very p. .nt second messenger system (turnover of phosphatidylinositol) by cholinergic agonists was discovered to be completely blocked by concurrent activation of receptors for amino acid transmitters. These results point to the conclusions that the cholinergic receptor is not particular labile and that its interaction with its second messenger target system is tightly regulated by noncholinergic inputs.

**KEYWORDS:** (U) *Acetylcholine, Acetylcholinesterase, Cholinesterase Inhibitors, Activation, Amine Acids, Cholinergic Nerves, Elevation, Hippocampus, In Vitro Analysis, Inhibition, Physiological Effects.*
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

RESPONSE (BIOLOGY), SENSE ORGANS, STIMULATION (GENERAL), SYNAPSE, NEUROCHEMICAL TRANSMISSION, STIMULATION (PHYSIOLOGY), NERVE TRANSMISSION

IDENTIFIERS: (U) WUAFOSR2312A3, PEG1102F

UNCLASSIFIED REPORT

ABSTRACT: (U) This technical program constitutes a theoretical research investigation of the kinetic mechanisms of negative ion formation in plasmas. This study was directed toward elucidating the mechanisms of the most important volume-dependent reactions that occur in hydrogen-ion H(-) (D(-)) source devices, primarily of the Belchenko-Dinov-Dudnikov (BDD) type and toward evaluating other light negative anions, such as (Li(-)), as possible sources. The primary goal of this research was to identify the most important reactions leading to negative ion production or destruction and to estimate these reactions leading to negative ion production or destruction and to estimate these reaction rates as a function of system parameters such as density, composition and temperature. A further goal was to explore new chemical sources for the production of light mass negative atomic ions. Results of this program furnish data and provide direction for more detailed investigations into the kinetics of both gas phase and gas-surface reaction rates of importance in ion source devices and provide input for reliable modeling of such systems. This investigation was carried out using quantum mechanical methods. Both ab initio and density functional approaches were employed. Keywords: Lithium ions; Hydrogen
ions; Deuterium ions; Potential energy surfaces; Negative ions; Dissociative attachment; H(-) Li2 ion-molecule reactions.

DESCRIPTORS: (U) *HYDROGEN, *IONS, *ANIONS, *PLASMAS(PHYSICS), DEUTERIUM, IONS, PARAMETERS, FUNCTIONS, KINETICS, LITHIUM, IONIZATION, ATTACHMENT, DISSOCIATION, VAPOR PHASES, ION SOURCES, LIGHT, RATES, REACTION TIME, SOURCES, POTENTIAL ENERGY, SURFACES, QUANTUM THEORY, RELIABILITY, THEORY, MODELS

IDENTIFIERS: (U) WUAFO5R2301A7, PEB1102F
Residual Limitations of Theoretical Atomic-Electron Binding Energies,

FEB 85 8P

PERSONAL AUTHORS: Chen, M. H. ; Crasemann, B. ; Martensson, N. ; Johansson, B.

CONTRACT NO. F48620-84-C-0039

PROJECT NO. 2031

TASK NO. A4

MONITOR: AFOSR
TR-85-0854

ABSTRACT: (U) Relativistic calculations of atomic-electron binding energies have been refined by using the relativistic L3-average scheme to treat open outer shells by including self-energy corrections for shells up to 3p as well as 4s, and accounting for energy shifts caused by interaction with Coster-Kronig continua. The contributions of ground-state correlation were estimated from the pair energy calculated through nonrelativistic many-body theory. The need for a relativistic theory of correlations is noted. As in our previous work, the calculations include relaxation, the effect of finite nuclear size, Breit interaction, and quantum-electrodynamic (QED) corrections. Results are compared with binding energies measured on free atoms and with solid-phase measurements on metals that have been corrected for solid-state shifts; these shifts were calculated under the assumption of complete screening with the core-ionized site treated as a neutralized metallic impurity atom in the original metallic host. Discrepancies between experimental energies and relativistic independent-particle calculations including relaxation, QED, and finite-nuclear-size corrections are traced to correlation corrections, uncertainties in the self-energy, and neglect of the effect of (super-)Coster-Kronig fluctuations.

DESCRIPTORS: (U) *ATOMIC ENERGY LEVELS, ELECTRONS, QUANTUM ELECTRODYNAMICS, RELAXATION, RELATIVITY THEORY, CORRELATION, ATOMIC PROPERTIES, REPRINTS

IDENTIFIERS: (U) Binding energy, WUAFOSR2031A4, PE61102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A159 035 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) A Kalman Filter Solution of the Inverse Scattering Problem with a Rational Reflection Coefficient, MAY 85 7P

PERSONAL AUTHORS: Levy, B. C.

PROJECT NO. 2304

 TASK NO. A1

MONITOR: AFOSR TR-85-0721

UNCLASSIFIED REPORT


ABSTRACT: (U) This paper presents a new inverse scattering method for reconstructing the reflectivity function of symmetric two-component wave equations, or the potential of a Schrodinger equation, when the reflection coefficient is rational. This method relies on the so-called Chandrasekhar equations which implement the Kalman filter associated to a stationary state-space model. These equations are derived by using first a general layer stripping principle to obtain some differential equations for reconstructing a general scattering medium, and by specializing these recursions to the case when the probing waves have a state-space model. (Author)

DESCRIPTORS: (U) *INVERSE SCATTERING, *KALMAN FILTERING, PROBLEM SOLVING, REFLECTIVITY, COEFFICIENTS, SCHRODINGER EQUATION, WAVE EQUATIONS, LINEAR DIFFERENTIAL EQUATIONS, REPRINTS

IDENTIFIERS: (U) Chandrasekhar equations, WUAFOSR2304A1, PE61102F

AD-A159 034

IOWA UNIV IOWA CITY

(U) Alkali Metal Diffuse Band Laser.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 84-31 May 85, JUL 85 12P

PERSONAL AUTHORS: Stwalley, W. C.

CONTRACT NO. AFOSR-84-0178

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-85-0738

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is described on study of a new class of potential excimer lasers based on diffuse bands of the alkali metal vapors. In particular, it has been established that the violet diffuse bands of sodium vapor and the yellow diffuse bands of potassium vapor are each composed of overlapping singlet and triplet 'excimer' emission continua of the diatomic molecule. The violet gain and low absorption loss previously found with laser optical pumping of sodium vapor have been confirmed and extended to yellow gain and low absorption loss in potassium vapor. Prospects for laser oscillation in the near future appear to be very good. (Author)


IDENTIFIERS: (U) WUAFOSR2301A1, PE61102F

AD-A159 034

UNCLASSIFIED PAGE 129 EVK15N
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 033  5/10

BEHAVIORAL RESEARCH ASSOCIATES WEST LAFAYETTE IN

(U) Biocybernetic Analysis of a Hybrid Workload Model.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-30 Mar 85 on Phase I,
MAY 85 40P

PERSONAL AUTHORS: Kantowitz, B. H.;
REPORT NO.  BRA-85-10
CONTRACT NO. F49620-84-C-0116
PROJECT NO. 3005
TASK NO.  A1
MONITOR: AFOSR
TR-85-0681

UNCLASSIFIED REPORT

ABSTRACT: (U) Biocybernetic measures - heart rate inter-beat interval (IBI) and event-related brain potential (ERP) - were used to provide converging operations to refine a hybrid model of attention and workload. Two experiments using the psychological refractory period paradigm were conducted with stimulus-response uncertainty and inter-stimulus interval (ISI) as manipulations of workload. Reaction time was influenced by uncertainty and ISI; IBI standard deviation and spectral data were influenced by uncertainty; preliminary analysis of ERP showed N200 amplitude to be influenced by uncertainty and ISI. These results were related to a hybrid processing model formulated by Kantowitz and Knight (1976). Keywords: Workload, Biocybernetic, Psychological refractory period, Heart rate, Sinus arrhythmia. Event-related potential.

DESCRIPTORS: (U) CYBERNETICS, HEART RATE, HYBRID SYSTEMS, REACTION TIME, STANDARD DEVIATION, ATTENTION, SPECTRA, WORKLOAD, MODELS, PROCESSING

IDENTIFIERS: (U) *Biocybernetics, WUAFOSR3005A1, PE61102F

UNCLASSIFIED SEARCH CONTROL NO. EVK15N

AD-A159 031  20/8  20/10

OREGON UNIV EUGENE DEPT OF PHYSICS

(U) Fluorescence Yields and X-Ray Production from Atomic Inner Shells,
AUG 84 25P

PERSONAL AUTHORS: Crasemann, B. ;
CONTRACT NO. F49620-85-C-0040, ARPA Order-4087
PROJECT NO. 2301
TASK NO.  A4
MONITOR: AFOSR
TR-85-0650

UNCLASSIFIED REPORT


ABSTRACT: (U) In this paper we briefly review the theory of photon emission in energetic atomic transition, with special emphasis on relativistic effects and gauge dependence. We review present-day ab initto calculations of the total widths of atomic hole states and point out some frustrating difficulties that remain unresolved. The consequent limitation on theoretical fluorescence yields of single-vacancy states are outlined, and some general principles regarding their fluorescence yields of multiply ionized systems are noted. (Author)

DESCRIPTORS: (U) *ATOMIC ENERGY LEVELS, *ELECTRON TRANSITIONS, *PHOTONS, *FLUORESCENCE, *X-RAYS, EMISSION, ELECTRONIC STATES, HOLES(ELECTRON DEFICIENCIES), IONIZATION, COLLISIONS

IDENTIFIERS: (U) Ion atom interactions

UNCLASSIFIED

PAGE 130 EVK15N
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A159 008  20/8  20/10
OREGON UNIV  EUGENE  DEPT OF PHYSICS

(U) Threshold Excitation of Short-Lived Atomic Inner-Shell
Hole States with Synchrotron Radiation,
MAR 85  SP

Crasemann, B.;

CONTRACT NO.  F49620-84-C-0039
PROJECT NO.  2301
TASK NO.  A4

MONITOR:  AFOSR
TR-85-0649

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:  Pub. in Physical Review Letters, v54
n11 p1142-1145, 18 Mar 85.

ABSTRACT:  (U) The Xe L subscript 3-W subscript 4 M
subscript 5 (superscript 1G Subscript 4) Auger spectrum,
photexcited in the vicinity of the L subscript 3 edge,
has been measured as a function of photon energy. The nd
spectator-electron satellite lines show resonant behavior.
The diagram line exhibits the largest (> 1 eV) post-
collision interaction shift yet observed. For comparison
with the data, the first fully quantum-mechanical
calculation of the post-collision interaction in deep
inner-shell Auger decay is performed, based on a resonant-
scattering approach that involves a complete summation
over intermediate L subscript 3 one-hole states.

DESCRIPTORS:  (U)  #ATOMIC ENERGY LEVELS, #ELECTRONIC
STATES, #HOLES(ELECTRON DEFICIENCIES), AUGER ELECTRONS,
SPECTRA, EXCITATION, THRESHOLD EFFECTS, PHOTOIONIZATION,
COLLISIONS, REPRINTS

IDENTIFIERS:  (U)  WUAFSR2301A4, PE81102F

AD-A159 008
Gamma distributions, Tolerance limits.

In order to more fully understand the physiological and psychological significance of event-related potentials, cortical and subcortical recordings are being obtained from monkeys performing in operant-conditioning tasks. Five cynomolgus monkeys were successfully trained in the cued-reaction time task at SRI International and recordings were obtained in several experimental conditions—tone discrimination, variation of interstimulus interval (ISI) and stimulus proportionality, and administration of atropine. Under some conditions stimulus salience was enhanced, as evidenced by enlarged evoked potentials, when the ISI and stimulus proportionality were altered. The effects of the anticholinergic drug atropine could be attributed to its peripheral effects. Preliminary examination of dynamic intracerebral interactions in one monkey was carried out in collaboration with A. Gevins at the EEG Systems Laboratory, and studies of two monkeys were continued at Stanford in order to study the P300 wave. Five female stump-tailed macaque monkeys were purchased, trained, and implanted and are ready for tone-light pairing and recording.

**ABSTRACT:**

**DEFINERS:**

- Neurophysiology, Biopotential
- Event-Related Potentials
- Monkey Experimentation
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 997 CONTINUED

NONKEYS, BRAIN, REACTION TIME, STIMULI, ATROPINE

IDENTIFIERS: (U) Brain slow potentials, LPN-SRI-LSU-4373, WJAFOSR2313A4, PE81102F

SEARCH CONTROL NO. EVK15N

AD-A158 998 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Realization and Approximation of Stationary Stochastic Processes.

DESCRIPTIVE NOTE: Technical rept.,

FEB 85 88P

PERSONAL AUTHORS: Avniel,Y.

REPORT NO. LIDS-TH-1440

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

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR

TR-85-0874

UNCLASSIFIED REPORT

ABSTRACT: (U) To a multivariate stationary stochastic process, the author associates a scattering matrix $S$, which measures the interaction between the past and future of the process. This matrix valued function can be viewed as the generalized phase function associated with the spectral density. It determines the density up to congruency only for a completely non-deterministic sequence. Using the theory of Adamjan-Arov-Krein on extensions of Hankel operators, this report establishes that the Hankel operator $H$ sub $S$ determines the Laurent operator $L$ sub $S$ as its unique norm preserving lifting. Employing the Nagy-Foias theory on unitary dilations, or its dual, Lax-Phillips scattering operator model, a realization theory for equivalent classes of stationary sequences with the same density is developed. The minimal equivalence class of Markovian representations is induced by the coprime factorization of the scattering matrix. This presents a unified approach to stochastic and deterministic realization theory, with $S$ as the analog of the frequency response function. To obtain reduced order models, the author approximates the given sequence with a jointly stationary one of a lower dimensional state space, minimizing the distance between the two sequences.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N

AD-A158 996 CONTINUED

AD-A158 992 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Matrix Convexity of the Moore-Penrose Inverse
and Some Applications.

DESCRIPTIVE NOTE:  Technical rept.,

JUL 85 18P

PERSONAL AUTHORS:  Kaffes, D. G. ; Rao, M. B. ; Mathew, T. ;
Subramanyam, K. ;

REPORT NO.  TR-85-28

CONTRACT NO.  F49620-85-C-0008

PROJECT NO.  2304

TASK NO.  A5

MONITOR:  AFOSR
TR-85-0697

UNCLASSIFIED REPORT

ABSTRACT:  (U)  This paper gives necessary and sufficient
conditions for the validity of an inequality. Keywords:
Theorems; Random matrices.

DESCRIPTORS:  (U)  *INEQUALITIES, VALIDATION,
MATRICES(MATHEMATICS), INVERSION

IDENTIFIERS:  (U)  Moore Penrose Inverse, WUAFOSR2304A5,
PE81102F

UNCLASSIFIED REPORT

AD-A158 996

AD-A158 992
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

HERNDON SCIENCE AND SOFTWARE INC SAN DIEGO CA

(U) Technological Applications of Earth Core Research.

DESCRIPTION NOTE: Final rept. 1 Jan 82-1 Jan 85,

MAY 85 37P

PERSONAL AUTHORS: Herndon, J. M. ;

REPORT NO. HSS1-82-0004

CONTRACT NO. F49620-82-C-0024

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR

TR-85-0728

UNCLASSIFIED REPORT

ABSTRACT: (U) The research undertaken under the present

AFOSR contract is intended to address the question of

what elements might be expected to form silicides in the

core of the Earth and is aimed at determining and

demonstrating the technological feasibility of new

concepts originating from the research. Specifically, the

research objectives are the following (1) Prepare a

complete bibliography on silicide technology, including

the physical and chemical properties; (2) Determine the

effects of phosphorous and copper on nickel silicide.

Conduct experiments to determine what elements form

silicides; (3) Conduct experiments on Earth core type

materials to provide new materials and processes. The

schedule is given for the tasks that are the research

objectives and the deliverables.

DESCRIPTORS: (U) *EARTH CORE, *SILICIDES, *CHEMICAL

ELEMENTS, *GEOCHEMISTRY, BIBLIOGRAPHIES, CHEMICAL

PROPERTIES, COPPER, MATERIALS, NICKEL, PHOSPHORUS,

PHYSICAL PROPERTIES, RESEARCH MANAGEMENT

IDENTIFIERS: (U) MUAFOSR2309A1, PE81102F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tectonophysics, v113 p271-282

Mar 85.

ABSTRACT: (U) The M sub L = 8.2 Gisborne earthquake of

March 4, 1986 occurred along the East Coast of the North

Island. Modeling of P and S body waves shows that the

focal mechanism of this event is consistent with

northwestward thrusting of the Pacific Plate beneath the

North Island (Phi = 248 deg, delta = 25 deg, and lambda =

131 deg). The focal depth is constrained to 18 km,

significantly less than the values of 25-30 km computed

from local network data. Estimates of the scalar moment,

source duration and stress-drop for the event are 4 x 10

to the 24th power dyne-cm, 2-3 s, and 20-120 bar,

respectively. Cross-correlation errors of synthetic to

observed waveforms were computed for all possible P and T

axis locations and slip vector orientations and contoured

on a projection of the focal sphere. The error contour

at which the synthetic waveforms distinctly diverged from

the observed waveforms was established by eye. The

procedure shows that the analysis of long-period body

waves, at least in this case, provides much better

constraint on focal mechanism orientation than does first

motion data alone.

DESCRIPTORS: (U) *EARTHQUAKES, *SEISMIC WAVES, NEW

ZEALAND, WAVE ANALYZERS, TECTONICS, PACIFIC OCEAN, PLATES,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 985 CONTINUED

DEPTH, CROSS CORRELATION, REPRINTS

IDENTIFIERS: (U) Body waves (Seismic waves), Plate tectonics, Pacific Plate, WUAFOSR2304A5, PE81102F

AD-A158 985 12/1

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Families of A-Optimal Block Designs for Comparing Test Treatments with a Control.

85 10P

PERSONAL AUTHORS: Hedayat, A. S.; Majumdar, D.;

CONTRACT NO. AFOSR-80-0170

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0844

UNCLASSIFIED REPORT


ABSTRACT: (U) A-optimal designs for comparing each of v test treatments simultaneously with a control, in b blocks of size k each are considered. It is shown that several families of BIB designs in the test treatments augmented by t replications of a control in each block are A-optimal. In particular these designs with t = 1 are optimal whenever (k-2) to the 2nd power + 1 < or = v < or = (k-1)to the 2nd power irrespective of the number of blocks. This includes BIB designs associated with finite projective and Euclidean geometries. (Author)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, *STATISTICAL TESTS, COMPARISON, THEOREMS, REPRINTS

IDENTIFIERS: (U) *Block designs, Test treatments, WUAFOSR2304A5, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 984 3/2 20/9
TUFTS UNIV WEDFORD MA DEPT OF PHYSICS

(U) The Sun and Nearby Stars: Microwave Observations at High Resolution,

APR 85 10P

PERSONAL AUTHORS: Lang K. R.; Kundu, M. R.

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFORS

TR-85-0648

UNCLASSIFIED REPORT


ABSTRACT: (U) High-resolution microwave observations are providing new insights into the nature of active regions and eruptions on the sun and nearby stars. The strength, evolution, and structure of magnetic fields in coronal loops can be determined by multiple-wavelength observations with the Very Large Array. Flare models can be tested with Very Large Array snapshot maps, which have angular resolutions of better than 1 second or arc in time periods as short as 10 seconds. Magnetic changes that precede solar eruptions on time scales of tens of minutes involve primarily emerging coronal loops and the interactions of two or more loops. Magnetic reconnection at the interface of two closed loops may accelerate electrons and trigger the release of microwave energy in the coronal parts of the magnetic loops. Nearby main-sequence stars of late spectral type emit slowly varying microwave radiation and stellar microwave bursts that show striking similarities to those of the sun. (Author).

DESCRIPTORS: (U) *STARS, *SOLAR FLARES, *PLASMAS(PHYSICS)
*SOLAR RADIO MAPS, SOLAR CORONA, MICROWAVE EQUIPMENT,
MAGNETIC FIELDS, BURST TRANSMISSION, HIGH RESOLUTION,
SUNSPOTS, SOLAR OBSERVATORIES, ANTENNA ARRAYS,
CHROMOSPHERE, POLARIZATION, INTERFACES, TEMPERATURE,
TRANSITIONS, LOOPS, REPRINTS

AD-A158 984

CONTINUED

IDENTIFIERS: (U) Nearby stars, Ad Leo, Coronal loops, VLA (Very large arrays), Plasma heating, Main sequence stars, Microwave bursts, Brightness temperature, Dwarf stars, M-type stars, Nonthermal emissions, PEB1102F, WUAFOSR2309A1
4. On the angle for stationary random fields.

ABSTRACT: (U) The angle between past and future for stationary random fields on the lattice points of the plane is defined and it is shown that in contrast with other problems related to the past of random fields the positivity of the angle between past and future is independent of different pasts which have been considered. Most of the known facts concerning the angle for stochastic processes have been extended to the case of random fields. Additional keywords: random variables; Hilbert space; Operators(Mathematics). (Author)

DESCRIPTORS: (U) *HILBERT SPACE, OPERATORS(MATHEMATICS), STATIONARY, RANDOM VARIABLES, STOCHASTIC PROCESSES

IDENTIFIERS: (U) *Stationary random fields, PEG1102F, WUAF0SR2304A5

UNCLASSIFIED REPORT

AD-A158 982

12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) On the Angle for Stationary Random Fields.

DESCRIPTIVE NOTE: Technical rept. Sep 84-Aug 85, APR 85 23P

PERSONAL AUTHORS: Mlamee, A. G.; Niemi, H.

REPORT NO. TR-92

CONTRACT NO. F48620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0677

UNCLASSIFIED REPORT

AD-A158 975

9/2

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) Database Theory.

DESCRIPTIVE NOTE: Final rept. 15 Jun 80-1 Nov 84, FEB 85 9P

PERSONAL AUTHORS: Ulman, J. D.

CONTRACT NO. AFOSR-80-0212

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR

TR-85-0673

UNCLASSIFIED REPORT

ABSTRACT: (U) The research carried out under this grant from 1979-1984 centered around the design of universal relation database systems. Certain theoretical aspects of dependency theory received attention, especially the theory of acyclic hypergraphs and their corresponding join dependencies. We investigated the use of first-order logic as a way to describe the effect of updates on universal-relation databases, and views in general. A number of other topics concerning database systems also received attention, including concurrency control by locking, data coding for massive write-once memories, hash table designs, and logical interfaces for database systems. Keyword: Database theory.

DESCRIPTORS: (U) *DATA BASES, *THEORY, CODING, DATA PROCESSING, LOGIC, READ WRITE MEMORIES, INTERFACES

IDENTIFIERS: (U) Universal relation databases, PEG1102F, WUAF0SR2304A2

UNCLASSIFIED

AD-A158 982

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Chemical Carcinogen (Hydrazine et al.) Induced Carcinogenesis of Human Diploid Fibroblasts in vitro.

DESCRIPTION NOTE: Final rept. 1 Jul 80-30 Nov 84.

JUN 85  23P

PERSONAL AUTHORS: Milo, G.

CONTRACT NO. AFOSR-83-0042

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR

TR-85-0829

UNCLASSIFIED REPORT

ABSTRACT: (U) There is data from in vivo animal systems that DMH and polynuclear hydrocarbons may pose a potential carcinogenic risk to man. They are metabolized to reactive intermediate metabolites that are localized in susceptible target sites. These sites may be away from the tissue that activates the proximate carcinogen. One such highly reactive intermediate obtained from DMH metabolism is methyldiazoxy methanol. This compound purportedly degrades to form methyldimine and formaldehyde. Methyldimine then forms a methyl radical after homolysis. This compound then is converted to a carbonium ion and the radical interacts with the purine bases in DNA. Methylazoxymethanol acetate, (MAMA) in the presence of colon, secum, and liver homogenates reduced NAD+ to NADH. The alcohol dehydrogenase-like enzymes are quite high in activity in the liver and may account for the organotypic response of NAM in animals. We continued biochemical studies to examine how these carcinogens were activated, entered the human cell and were transported to the nucleus. We also studied how these reactive carcinogenic intermediates interacted with different bases in the DNA.

DESCRIPTORS: (U) *HYDRAZINES, *HYDRAZINE DERIVATIVES, *CARCINOGENS, FIBROBLASTS, IN VITRO ANALYSIS, BIOCHEMISTRY, HUMANS, RISK, METABOLISM

AD-A158 974

CONTINUED

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A5, LPN-OSRF-783409/715087

AD-A158 974
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 973 12/1

PITTSBURGH UNIV PA DEPT OF ELECTRICAL ENGINEERING

(U) Shift-Variant Multidimensional Systems.

DESCRIPTIVE NOTE: Final research rept. 1 Feb 83-31 Mar 85,

MAY 85 111P

PERSONAL AUTHORS: Boss, N. K.;

CONTRACT NO. AFOSR-83-0038

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR

TR-85-0724

UNCLASSIFIED REPORT

ABSTRACT: (U) To a great extent the techniques for
analysis and restoration of images has been developed
under the assumption that the system is linear shift-

invariant (LSI). These techniques are successful in some
cases because a system which is diffraction-limited or a
system whose object plane undergoes uniform linear motion
perpendicular to the system reference axis does indeed
satisfy these assumptions. However, LSI systems are
singled out for study mainly because of the widespread
understanding of the Fourier Transform theory along with
well-known fast algorithms for its implementation. In
comparison with LSI systems, very little work has been
done on linear shift-variant (LSV) systems. Most of the
research on two dimensional LSV systems has been done on
restoration techniques by means of coordinate
transformations. This technique, decomposes the LSV
system into a distortion of the input plane followed by a
shift-invariant operation and terminated by a distortion
of the output plane. The primary objective of this
research is to provide not only a mathematical structure
for the state-space modeling of discrete LSV systems but
to apply this model to the problems of efficient analysis
and deconvolution of multidimensional systems. Additional
keywords: Mathematical models; Images restoration.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *IMAGE

RESTORATION, ALGORITHMS, AXES, COORDINATES, DISTORTION,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 969 12/1
RENSSLEAER OBSERVATORY TROY NY


DESCRIPTIVE NOTE: Annual scientific rept. 1 Jun 84-31 May 85,
JUN 85 29P

PERSONAL AUTHORS: Flaherty, J. E.;

PROJECT NO. AFOSR-80-0192

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0719

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by this report the investigators continued their research on the development and application of adaptive numerical methods for singularly perturbed initial-boundary value problems for partial differential equations. They continued their analysis of the stability of mesh moving schemes for one-dimensional parabolic problems. They also developed a moving mesh scheme with local refinement for two-dimensional hyperbolic systems and are considering a similar scheme for parabolic problems. They are applying our methods to several interesting physical problems, such as elastic-plastic solids, combustion, and a nonlinear Schrödinger equation which exhibits self-focusing. (Author)

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *NUMERICAL METHODS AND PROCEDURES, ADAPTATION, BOUNDARY VALUE PROBLEMS, COMBUSTION, DIFFERENTIAL EQUATIONS, ELASTIC PROPERTIES, HYPERBOLAS, ONE DIMENSIONAL, PARABOLAS, PERTURBATION THEORY, PERTURBATIONS, PHYSICAL PROPERTIES, PLASTIC PROPERTIES, SCHRODINGER EQUATION, SOLIDS, TWO DIMENSIONAL, NONLINEAR DIFFERENTIAL EQUATIONS, MESH

SEARCH CONTROL NO. EVK15N

AD-A158 968 9/5 20/7 20/8
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB


DESCRIPTIVE NOTE: Final technical rept. 15 Dec 79-29 Jan 85,
MAY 85 27P

PERSONAL AUTHORS: Hess, D. W.;

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR
TR-85-0736

UNCLASSIFIED REPORT

ABSTRACT: (U) The lithographic performance of a polymer resist material is determined by several processes. First, uniform and controllable films of the resist must be reproducibly applied to the surface of substrates. Second, the radiation/polymer interaction is important since it affects the sensitivity of the resist. Third, the development or dissolution process is crucial because this step determines the ability to create useable patterns in the resist film. Finally, for Very Large Scale Integration (VLSI), dry etching processes are replacing liquid techniques; thus, the interaction of resists with glow discharges can often determine the utility of specific materials. Under AFOSR Grant 80-0078, various aspects of the above criteria were studied in order to gain fundamental understanding of these important process steps.

DESCRIPTORS: (U) *DRY MATERIALS, *INTEGRATION, *ELECTRON BEAMS, *X RAYS, ETCHING, GLOW DISCHARGES, LIQUIDS, SUBSTRATES, HIGH SENSITIVITY, INTERACTIONS, POLYMERS, RADIATION, MATERIALS

IDENTIFIERS: (U) PE61102F, WJAFOSR2308B2

AD-A158 969

UNCLASSIFIED

PAGE 142 EVK15N
Spatial summation area, and temporal summation area are much larger for motion-defined objects than for brightness-defined objects. (4) We report evidence that the Vector Analysis technique of mathematics may be relevant to the physiological study of visual cues in guided self-motion. Keywords: Vision; flying performance; spatial form vision; motion perception; size discrimination; camouflage; orientation; discrimination.

DESCRIPTORS: (U) +DISCRIMINATION +VISION, +VISUAL PERCEPTION, CAMOUFLAGE, HUMANS, MOTION, DETECTION, FLIGHT, HELICOPTERS, GRASSES, LABORATORY TESTS, CONTRAST, MOTION, SENSITIVITY, NERVE CELLS, ORIENTATION(DIRECTION), BACKGROUND, CUES(STIMULI), VECTOR ANALYSIS, VISUAL CORTEX, BRAIN, PILOTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

UNCLASSIFIED REPORT

ABSTRACT: (U) This report present four studies. (1) An individual's ability to discriminate small differences in orientation about 5% and 0.5 deg respectively contrasts with the coarse size and orientation selectivity of neurons in the visual cortex of the brain. We report evidence that these fine discriminations are achieved by means of opponent processing: size discrimination is determined by antagonism between neurons that are coarsely selective for size, and orientation discrimination is mediated by neurons that are coarsely selective for orientation. Opponent processing implies that the neurons that determine detection are not the neurons that determine fine discrimination: we have experimentally verified that prediction. (2) We have measured motion discrimination in pilots and attempted to predict flying performance in simulators and telemetry-tracked aircraft. Correlations between laboratory tests and flying performance were encouraging, and were much stronger than for simple visual sensitivities such as motion on contrast sensitivity. (3) Some objects are invisible unless they move relative to the background, for example, a grassy hillock viewed against grass in nap of the earth helicopter flight. We have compared human visual sensitivity to such objects, with sensitivity to conventional objects defined by brightness difference.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 961 9/1 20/3
SPIRE CORP BEDFORD MA
(U) Improved Lifetime High Voltage Switch Electrode.
DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 May 85,
JUN 85 49P
PERSONAL AUTHORS: Halverson,W.
REPORT NO. SPIRE-FR-60053
CONTRACT NO. F49620-84-C-0120
PROJECT NO. 2301
TASK NO. A7
MONITOR: AFOSR
TR-85-0733

UNCLASSIFIED REPORT

ABSTRACT: (U) In this Phase I Small Business Innovation Research (SBIR) program, preliminary tests of ion implantation to increase the lifetime of spark switch electrodes have indicated that a 185 keV carbon ion implant into a tungsten-copper composite has reduced electrode erosion by a factor of two to four. Apparently, the thin layer of tungsten carbide (WC) has better thermal properties than pure tungsten; the WC may have penetrated into the unimplanted body of the electrode by liquid and/or solid phase diffuson during erosion testing. These encouraging results should provide the basis for a Phase II SBIR program to investigate further the physical and chemical effects of ion implantation on spark gap electrodes and to optimize the technique for applications. Keywords include: Spark switches, electrodes, and ion implantation.

DESCRIPTORS: (U) *ELECTRODES, *SPARKS, *SPARK GAPS, *SWITCHES, ION IMPLANTATION, PURITY, DIFFUSION, THERMAL PROPERTIES, TUNGSTEN CARBIDES, EROSION, CHEMICALS, LAYERS, COMPOSITE MATERIALS

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A7

AD-A158 950

PRINCETON UNIV NJ
DESCRIPTIVE NOTE: Final rept. 1 Mar 81-28 Feb 85,
85 89P
PERSONAL AUTHORS: Happer,W.;Wu,Z.;Daniels,J.;Kitano,M.;Hende,P.
REPORT NO. AFCRL-84-414, AFCR
CONTRACT NO. AFOSR-81-0104
MONITOR: AFOSR TR-85-0729

UNCLASSIFIED REPORT

ABSTRACT: (U) The major thrust of the work supported by this grant during the past year has been studies of spin polarized noble gases. The aim of the work has been to understand the gas-phase spin transfer, which in heavy noble gases is dominated by interactions in van der Waals molecules. We have measured the three body formation rates and the collisional breakup rates of these molecules. We have also measured the strengths of the major spin interactions in the molecules. We have developed a simple theory of the spin rotation interaction in alkali-noble-gas molecules. This is the first theory which successfully accounts for the observed spin rotation constants in heavy noble gases. While much of the work is basic physics there are also close ties between this work and various practical problems. Atomic frequency standards and new gyroscopes, are examples of applied areas which are closely related to this work.

DESCRIPTORS: (U) *SPIN STATES, *POLARIZATION, *RARE GASES, MOLECULE MOLECULE INTERACTIONS, REACTION KINETICS, MOLECULAR ROTATION, ATOMIC PROPERTIES, FREQUENCY STANDARDS, COLLISIONS, RATES, GYROSCOPES, MOLECULES, INTERACTIONS, SPINNING(MOTION), CONSTANTS, ROTATION, PHYSICS, THEORY
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 949 20/8 7/4

STEVEN'S INST OF TECH HOBOKEN NJ DEPT OF PHYSICS AND
ENGINEERING PHYSICS

(U) Surface Production of Negative Hydrogen Ions.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 84-31 May 85,
JUL 85 81P

PERSONAL AUTHORS: Seid, N.

PROJECT NO. AFOSR-83-0230

TASK NO. A7

MONITOR: AFOSR
TR-85-0726

UNCLASSIFIED REPORT

ABSTRACT: (U) Measurements of sputtering of adsorbed hydrogen by cesium ion bombardment have been completed. The temperature of the desorbed negative hydrogen ions is about 0.5 percent of the bombardment energy. An experiment for studying bombardment with cesium and hydrogen ions has been constructed. Formation of cesium coverage due to cesium bombardment of a molybdenum target has been studied. Cesium coverage is only weakly dependent on bombardment energy in the range from 100 to 500 eV. This is due to cesium ion implantation. Originator supplied keywords include: Ion Emission; Atom, Molecule and Ion Impact; Sputtering; Ion Sources.

DESCRIPTORS: (U) HYDROGEN, *CESIUM, *ANIONS, *ION BOMBARDMENT, ION ION INTERACTIONS, SURFACE CHEMISTRY, ADSORPTION, ION IMPLANTATION, EMISSION, IONS, ION SOURCES, PRODUCTION, SURFACES, ATOMS, MOLYBDENUM, TARGETS, SPUTTERING

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A7

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DTIC REPORT BIBLIOGRAPHY

AD-A158 941 CONTINUED

HETEROGENEITY, HIGH RATE, LAGRANGIAN FUNCTIONS, MACHINES,
NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES,
PATHS, PROCESSING EQUIPMENT, RATES, SOLUTIONS(GENERAL),
TIME, LAGRANGIAN FUNCTIONS, PROBLEM SOLVING

IDENTIFIERS: (U) PEG1102F

SEARCH CONTROL NO. EVK15N

AD-A158 941 11/4

NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

(U) Effective Behavior of Composite Materials.

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

APR 85 8P

PERSONAL AUTHORS: Papanicolaou, G. C.;

REPORT NO. 5274192

CONTRACT NO. AFOSR-80-0228

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR

TR-85-0671

UNCLASSIFIED REPORT

ABSTRACT: (U) The main results of our work fall into three categories which we list in order of significance to our present and future work: (1) Focusing a singularity of the nonlinear Schrodinger equation. We have solved by a careful analytical-numerical method the basic question of what the local rate of blow-up is for solutions of the nonlinear Schrodinger equation with cubic nonlinearity in 2 space dimensions. This problem is a basic one that arises in many aspects of nonlinear wave propagation. (2) Selfdiffusion of interacting Brownian motions. Using methods of wave propagation in random media that we had developed earlier, we were able to study the effective behavior of a tagged Brownian particle in interaction with an infinite system of other such particles. (3) Bounds for effective properties of composites by analytic continuation. The analytic continuation method was known to work only for two component materials. In our work we extend it to multicomponent materials by using the theory of several complex variables.

DESCRIPTORS: (U) COMPOSITE MATERIALS, BROWNIAN MOTION,
INTERACTIONS, NONLINEAR PROPAGATION ANALYSIS, WAVE
PROPAGATION, LABELED SUBSTANCES, PARTICLES, COMPLEX
VARIABLES, NONLINEAR SYSTEMS, SCHRODINGER EQUATION, MEDIA,
(U) Stochastic Integrals and Processes with Independent Increments.

DESCRIPTIVE NOTE: Technical rept.,
MAR 85 61P

PERSONAL AUTHORS: Hudson, W. N.;

REPORT NO. TR-98

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0679

UNCLASSIFIED REPORT

ABSTRACT: (U) Stochastic integrals are defined using processes with independent increments as integrators. A simple and perhaps new method is given for obtaining approximating simple integrands. In the special case where the integrand is a stable motion of index p epsilon the integrand may have paths in Lp. Basic properties are established. Then the characteristic functions of integrals involving nonrandom integrands are computed and used to establish necessary and sufficient conditions for the independence of such integrals. Additional keywords: Stochastically continuous processes; Brownian motion. (Author)

DESCRIPTORS: (U) *INTEGRALS, *STOCHASTIC PROCESSES, BROWNIAN MOTION, FUNCTIONS, MOTION, STABILITY, COMPUTATIONS, CONTINUITY

IDENTIFIERS: (U) Integrands, WUAFOSR2304A5, PE61102F
ABSTRACT: (U) The digital medial axis transfer (MAT) represents and image subset S as the union of maximal upright squares contained in S. Brute-force algorithms for computing geometric properties of S from its MAT require time O (n log n), where n is the number of squares. Over the past few years, however, algorithms have been developed that compute properties for a union of upright rectangles in time O (n log n), which makes the use of the MAT much more attractive. This document reviews these algorithms and also present efficient algorithms for computing union-of-rectangle representations of derived sets (union, intersection, complement) and for conversion between the union of rectangles and other representations of a subset. (Author)

DESCRIPTORS: (U) *ALGORITHMS, TRANSFORMATIONS(MATHMATICS), AXES, DIGITAL SYSTEMS, COMPUTATIONS, GEOMETRY

IDENTIFIERS: (U) PE811102F, WUAFOSR2304K2
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

Preference/Avoidance, Microbial Community, Amolesome headleyi, Daphnia pulex, Paratanytarsus parthenogenica.

DESCRIPTORS: (U) *AQUATIC ORGANISMS, *JET ENGINE FUELS, *TOXICITY, BENZENE, DAPHNIA, INVERTEBRATES, LOW LEVEL, MICROORGANISMS, MILITARY APPLICATIONS, PETROLEUM PRODUCTS, PULEX, SENSITIVITY, SUBLETHAL DOSAGE, TOLUENES, TOXIC AGENTS, WATER, FISHES, COMMUNITIES

IDENTIFIERS: (U) PE81102F, WUA9052312AS

SEARCH CONTROL NO. EVK15N

AD-A156 931 21/4 21/2 20/B 20/4

YALE UNIV NEW HAVEN CONN

(U) Droplet Size and Evaporation Rate within a Two-Phase Flow by Morphology-Dependent Resonances in the Optical Spectra.

DESCRIPTIVE NOTE: Final rept. 15 Nov 81-31 Dec 84,

APR 85 28P

PERSONAL AUTHORS: Chang, R. K.; Chu, B. T.; Long, M. B.

CONTRACT NO. F49620-82-K-0005

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-85-0566

UNCLASSIFIED REPORT

ABSTRACT: (U) In two-phase chemically reacting flows, the size, shape, and chemical content of fuel droplets affect combustion and their chemical by-products. A new in-situ and nonintrusive optical technique has been developed which provides highly accurate (one part in 10000 - 100,000) size and shape determination, as well as provide chemical speciation of the majority species forming the droplet. This all-optical technique uses the morphology-dependent resonances (MDRs) of spheres, spheroids, or any shape that enables an internal wave to travel around a great circle with appropriate phase shift. These MDRs in the fluorescence spectra of dye-doped droplets flowing in a linear stream have also provided information on: (1) evaporation rate of interacting droplets flowing in the ambient or heated environment; (2) condensation rate of interacting droplets flowing in a saturated vapor; and (3) surface tension and bulk viscosity of individual droplets which have been perturbed by a laser beam so as to cause slight shape distortions, e.g., from spheres to oblate or prolate spheroids. MDRs can provide wavelength selective high Q optical feedback for the internally generated fluorescent and Raman radiation. By using this high optical feedback, lasing from individual dye-tagged droplets of approx. 20 micron radius has been achieved. The potential of using

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DTIC REPORT BIBLIOGRAPHY

AD-A158 931 CONTINUED

AD-A158 928 5/10

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) When Words Collide: Orthographic and Phonological Interference during Word Processing,

83 27P

PERSONAL AUTHORS: Polich, J.; McCarthy, G.; Wang, M. S.; Donchin, E.;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR

TR-85-0611

UNCLASSIFIED REPORT


ABSTRACT: (U) The interaction between orthographic and phonological information was studied in two experiments by requiring subjects to match visually presented word pairs on the basis of their visual or rhyming similarity. Word pairs either rhymed and looked alike, rhymed but did not look alike, looked alike but did not rhyme, or did not rhyme and did not look alike. In Experiment 1 under rhyme matching, reaction time (RT) was markedly increased whenever there was a conflict between orthographic and phonological cues. Under visual matching, overall RT was shorter than rhyme matching, with visually similar rhyming and non-rhyming pairs producing equally rapid and short responses compared to the non-rhyming but visually different word pairs. Most subjects also responded slower to rhyming and visually similar stimuli compared to word pairs that did not look alike or rhyme. Experiment 2 sought to specify the processing locus of these effects by recording event-related brain potentials (ERPs) under task conditions similar to the first experiment. The RT data essentially replicated the effects found in Experiment 1 for both matching tasks. The ERP data viewed in the context of these results suggested that the interaction of the orthographic and phonological codes begins at least at the stimulus comparison processing
stage, but that conflict may also contribute to delays in response selection. The results are discussed in terms of several current models of word processing.

DESCRIPTORS: (U) WORDS(LANGUAGE), INFORMATION PROCESSING, COMPARISON, MATCHING, PERCEPTION(Psychology), REACTION TIME, REPRINTS

IDENTIFIERS: (U) Word processing(Psychology), 881102F, WUAFOSR2313A4

ABSTRACT: (U) Two studies were conducted in separate areas concerned with visuospatial abilities. The first study was designed to examine the effects of type of instruction (verbal versus graphic) and sex of subject on the acquisition of procedural knowledge in a spatial task. The spatial task employed was a computerized maze learning task, with trials to criterion and errors to criterion serving as dependent variables. Results indicated that graphic instructions led to fewer errors and trials to criterion than did verbal instructions. However, the performance of males was not superior to that of females, and the hypothesized interaction involving type of instruction and sex of subject was not found. Correlations between psychometric measures of cognitive abilities and measures of maze learning were easily interpreted for learning under graphic instructions but were difficult to interpret for learning under verbal instructions. These findings suggested the need for additional research focusing on (a) replicating the current results, (b) delineating the factors underlying individuals' learning effectiveness under different types of instructions, and (c) examining individuals' awareness of the relationship between learning effectiveness and type of instruction in visuospatial tasks. The second study was designed to determine the relationship between performance on...
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 919 CONTINUED

traditional paper-and-pencil tests of spatial abilities and performance on a task required macrospatial cognitive skills. Keywords include: Visuospatial abilities; cognitive abilities; maze learning; macrospatial cognition.

DESCRIPTIONS: (U) *LEARNING, *COGNITION, *MENTAL ABILITY, SPACE PERCEPTION, SKILLS, INSTRUCTIONS, VISUAL PERCEPTION, PERFORMANCE(HUMAN), TEACHING METHODS, SPEECH, PSYCHOMETRICS, FEMALES, VARIABLES, GRAPHICS, SEX, PERCEPTION, ACQUISITION

IDENTIFIERS: (U) Verbal instructions, Visuospatial abilities, Maze learning, Individual differences, Gender differences, Complex tasks, PEB1102F, WUAFSR231309

AD-A158 918 12/1

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) ARC Colorings, Partial Path Groups, and Parallel Graph Contractions.

DESCRIPTION NOTE: Technical rept., JUL 85 40P

PERSONAL AUTHORS: Rosenfeld, A.

REPORT NO. CAR-TR-132, CS-TR-1524

CONTRACT NO. F49620-85-K-0009

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFDSR TR-85-0718

UNCLASSIFIED

ABSTRACT: (U) This document defines an algebraic structure on the paths in a graph based on a coloring of the arcs. Using this structure, basic classes of graphs (trees, hypercubes, arrays, cliques, etc.) are characterized by simple algebraic properties. The structure provides a framework for defining parallel contraction operations on a graph, in which many pairs of nodes are simultaneously collapsed into single nodes, but the degree of the graph does not increase. Such operations are useful in defining systematic strategies for simulating large networks of processors by smaller ones, or in building pyramids of networks. Additional keywords: Applied mathematics; Computer graphics; Computer vision; and Mesh. (Author)

DESCRIPTIONS: (U) *ALGEBRA, *GRAPHS, *PATHS, STRUCTURAL PROPERTIES, COMPUTER GRAPHICS, NODES, TREES, APPLIED MATHEMATICS, CONTRACTION, PARALLEL ORIENTATION, STRATEGY, COLORING, MESH

IDENTIFIERS: (U) *Computer vision, PEB1102F, WUAFSR2304A7

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 897  6/19

WASHINGTON UNIV  SEATTLE

(U) Influence of G-Suit Abdominal Bladder Inflation on Gas Exchange during +G(z) Stress,

85  9P

PERSONAL AUTHORS: Modell, H. I.; Beeman, P.; Mendenhall, J.;

CONTRACT NO.  F49620-81-C-0055

PROJECT NO.  2312

TASK NO.  A3

MONITOR: AFOSR

TR-85-0606

UNCLASSIFIED REPORT


ABSTRACT: (U) Available data relating duration of acceleration stress to blood gas exchange status is limited. Furthermore, studies focusing on pulmonary gas exchange during acceleration stress when abdominal restriction is imposed have yielded conflicting results. To examine the time course of blood gas changes occurring during exposure to acceleration stress in dogs and the influence of G-suit abdominal bladder inflation on this time course, seven spontaneously breathing pentobarbital-anesthetized adult mongrel dogs were exposed to 60 s of up to +5 acceleration stress with and without G-suit abdominal bladder inflation. Arterial and mixed venous blood were sampled for blood gas analysis during the first and last 20 s of the exposure and at 3 min postexposure. Little change in blood gas status was seen at +3 acceleration regardless of G-suit status. However, with G-suit inflation, arterial PO2 fell by a mean of 14.7 Torr during the first 20 s at +4 acceleration (P<0.01, t test) and 20.6 Torr at +5 acceleration (P<0.01). It continued to fall an additional 10 Torr during the next 40 s at both +4 and +5 acceleration. Arterial PO2 was still 5-10 Torr below control values (P<0.05) 3 min postexposure.

DESCRIPTIONS: (U) +ACCELERATION, +G SUITS,

AD-A158 897

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DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N
AD-A158 885  CONTINUED

LEHIGH UNIV. BETHLEHEM PA DEPT OF METALLURGY AND
MATERIALS ENGINEERING

(U) Crack Propagation in Powder Metallurgy Hot
Isostatically Pressed Nickel-Based Alloy.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 84,
MAY 85 33P

PERSONAL AUTHORS:  Hertzberg, R. W.

CONTRACT NO.  AFOSR-83-0028
PROJECT NO.  2308

TASK NO.  A1

MONITOR:  AFOSR
TR-85-0672

UNCLASSIFIED REPORT

ABSTRACT: (U) The room temperature threshold fatigue
behavior of P/N HIP'd L.C. Astroloy has been examined.
Material with grain sizes ranging from 5 micrometers to
50 micrometers has been tested to investigate the
influence of grain size on the threshold response. In
disc compact tension specimens grain size is observed to
have little influence on the threshold values; in
contrast tests conducted in four point bend specimens
exhibit lower threshold values. Consideration has also
been given to the growth of short cracks under cyclic
loading at low stress intensities. The data reveal that
under these conditions short cracks propagate at a
consistently faster rate than long cracks subject to the
same nominal stress intensity. Analytical work has been
conducted which suggests that this behavior may be
rationalized in terms of a more appropriate driving force
for crack extension. Detailed microstructural information
has been collected which identifies the major second
phase particles present in the alloy. The effect of
simple heat treatments on the distribution of these
particles has been observed to be negligible. (Author)

DESCRIPTORS: (U)  *CRACK PROPAGATION, *POWDER METALS,
*NICKEL ALLOYS, CRACKS, CYCLES, DRIVES, FATIGUE(MECHANICS),
FORCE(MECHANICS), GRAIN SIZE, HEAT TREATMENT,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 883  20/12  20/3

BATTELLIE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Electrical and Thermal Transport Property Studies of High-Temperature Thermoelectric Materials.

DESCRIPTIVE NOTE: Interim technical rept. 15 May 84-15 May 85.

JUN 85  73P


CONTRACT NO.  F49620-83-C-0108

PROJECT NO.  2308

TASK NO.  A2

MONITOR: AFOSR

TR-85-0723

UNCLASSIFIED REPORT

ABSTRACT: (U) The research effort during this reporting period has continued to emphasize the study of electronically conducting oxides, which was initiated in the previous reporting period. The high-temperature transport property data base has been expanded by continued measurements in several systems under study, and a theoretical model for thermoelectric properties based on a small polaron transport has been developed. The study of the transport properties of the In203-SnO2 system, which was initiated during the previous reporting period, has been completed. Low values for the figure of merit were obtained, as expected, for these degenerate-type semiconductors. Some high-temperature materials that exhibit high figures of merit. The theoretical model developed under this program predicts that narrow-band semiconductors with small polaron hopping along inequivalent sites of distorted sublattices can result in increases in both electrical conductivity and Seebeck coefficient with temperature without significant increases in thermal conductivity. High figures of merit, greater than 1.0 at 1000 K, that increases with temperature are predicted by the model. The model is being applied to the divalent metal-doped (Y, La)CrO3 systems with the ABO3 perovskite structure. Transport

AD-A158 883  CONTINUED

property data obtained during this reporting period for different divalent metal dopants at different concentrations are being used to evaluate the model.

DESCRIPTORS: (U) *ELECTRICAL CONDUCTIVITY, *THERMAL CONDUCTIVITY, *SEMICONDUCTORS, *RARE EARTH ELEMENTS, FIGURE OF MERIT, HIGH TEMPERATURE, DOPING, SULFIDES, SEEBECK EFFECT, CHROMIUM COMPOUNDS, THERMOELECTRICITY, CRYSTAL LATTICES, CERAMIC MATERIALS, MANGANATES, MODELS, OXIDES

IDENTIFIERS: (U) Polaron, WUA0SR23O6A2, PE61102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 880 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Number of Bootstrap Simulations Required to Construct a Confidence Interval.

DESCRIPTION NOTE: Technical rept.,

MAR 85 16P

PERSONAL AUTHOR: Hall, P.;

REPORT NO. TR-97

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0878

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this document is to make two points about the effect of the number of bootstrap simulations, B, on percentile bootstrap confidence intervals. The first point concerns coverage probability; the second, distance of the simulated critical point from the true critical point derived with B=Infinity. In both cases the author has in mind applications to smooth statistics, such as the Studentized mean of a sample drawn from a continuous distribution. He indicates the change that have to be made if the distribution of the statistic is not smooth. Additional keywords: Exponenive functions.

DESCRIPTORS: (U) *STATISTICAL FUNCTIONS, *EXPONENTIAL FUNCTIONS, STATISTICS, DISTRIBUTION, SIMULATION, INTERVALS

IDENTIFIERS: (U) WUAFOSR2304A5, PEB1102F

AD-A158 879

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVK15N

AD-A158 879 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES


DESCRIPTION NOTE: Technical rept.,

MAY 85 40P

PERSONAL AUTHOR: Niame, A. G.;Pourahmadi, M.;

REPORT NO. TR-99

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0875

ABSTRACT: (U) An important problem in prediction theory of weakly stationary stochastic processes (WSSP) is to find conditions on the process, or equivalently on its spectral distribution F, so that the linear least square predictor of a future value of the process admits a mean-convergent series representation in terms of the past (observed) values of the process. Recently, using the notion of positivity of the angle between the past-present and the future subspaces of the process it was shown by Pourahmadi that the series representation of the predictor is possible under some weaker conditions. This was made possible by using the idea of angle due to Nelson and Szego for a multivariate extension of this. However these results hold under conditions which require the process to be full rank. The main purpose of this document is to consider the same problem, including their autoregressive representation, for the degenerate WSSP's. Additional keywords: Moving average representation.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, LEAST SQUARES METHOD, LINEAR SYSTEMS, MATHEMATICAL PREDICTION, STATIONARY, STOCHASTIC PROCESSES, THEORY
ABSTRACT: (U) This report describes work performed on a program for fabrication and characterization of nonlinear optical properties of HgCdTe superlattices. We determined early on that performing nonlinear optical experiments (i.e., optical phase conjugation and optical bistability) on such superlattices requires the fabrication of thick (> or = 2 micron) samples. The growth of thick superlattices with very thin individual layers, on the other hand, can best be accomplished by using an automated MBE (Molecular Beam Epitaxy) system. We launched a major effort to automate our existing MBE system which is due for completion by the end of July 1985. This report also describes the automation design, software, and the computer-controlled hardware.

DESCRIPTORS: (U) *CADMIUM TELLURIDES, AUTOMATION, COMPUTER PROGRAMS, EPITAXIAL GROWTH, MOLECULAR BEAMS, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, LATTICE DYNAMICS, MERCURY COMPOUNDS

IDENTIFIERS: (U) Superlattices, Nonlinear optics, Mercury cadmium tellurides, Bistable optics, MBE(Molecular Beam Epitaxy), WUAFSR2305B4, PE61102F

ABSTRACT: (U) The time courses of synthesis of three neuronal cell-type specific phosphoproteins, Synapsin I, Synapsin III and G-Substrate, were determined in developing rat brains. The appearance of these proteins was concurrent with synapse formation. Two partial cDNA clones for Synapsin I were isolated from a rat brain cDNA expression library and the nucleotided sequences were determined. The mRNA for these clones was shown to be brain specific. Estimates for the sizes of the potential mRNAs for Synapsin I and Synapsin III were determined. A second rat brain cDNA expression library was generated for screening for synapsin III clones. A monoclonal antibody specific for synapsin III was identified for screening this library. A bovine caudate cDNA and rabbit cerebellar cDNA library were generated for obtaining, respectively, DARPP-32 and G-Substrate cDNA clones. Oligonucleotide probes specific for DARPP-32 and G-Substrate were synthesized for screening these libraries. Originator supplied keywords include: Oligonucleotide; Monoclonal; Synapsin I; Calcium/CaMmodulin.

DESCRIPTORS: (U) *PHOSPHORYLATION, *PROTEINS, *PHOSPHOPROTEINS, ANTIBODIES, BRAIN, CALCIUM, CLONES, RABBITS, RATS, SIZES(DIMENSIONS), SYNTHESIS

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N

AD-A158 889  12/1
MARYLAND UNIV  COLLEGE PARK  DEPT OF MATHEMATICS

DESCRIPTIVE NOTE: Technical rept.,
APR 85  24P
PERSONAL AUTHORS: Kedem, B.
REPORT NO. TR-85-10
CONTRACT NO. AFOSR-82-0187
MONITOR: AFOSR
TR-85-0680

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this document is to
introduce a graphical device useful as a measure of
similarity or as a goodness of fit criterion for
hypothesized time series models. It is based on the
actual oscillation observed in time series as depicted by
axis-crossings and higher order crossings. Higher order
crossings (HOC) are axis-crossings of differenced time
series and are closely linked to the spectral content of
the series. In fact under the Gaussian assumption, to
which we shall adhere, HOC determine the finite
dimensional distributions up to a scale parameter given
that the mean is zero. The main advantage of HOC is that
they are easily obtained from an observed series and that
only very few of them are needed, as the discriminatory
power in HOC usually diminishes with their order. Higher
order crossings in time series discrimination were
discussed in Kedem and Slud (1981), (1982), where a
certain goodness of fit criterion is suggested. Here
however the emphasis is on a graphical device rather than
a single test statistic. This graphical method may be
shown useful in answering the question 'Does a given time
series oscillate as a certain hypothesized model'? Some
examples with real and simulated data demonstrate the use
and potential of this method.

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, *GRAPHS,
CROSSINGS, SIMULATION, MATHEMATICAL MODELS, OSCILLATION,
PARAMETERS, SCALE, DISCRIMINATION
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 869 CONTINUED

IDENTIFIERS: (U) Axis(Crossings), WUAFOSR2304A5,
PE61102F

CONNECTICUT UNIV STORRS INST OF MATERIALS SCIENCE

(U) Metallic Glasses: Investigation of Electronic
Structure and its Relationship to Physical Properties.

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

NOV 84 42P

PERSONAL AUTHORS: Hines, W. A.

PROJECT NO. 2306

CONTRACT NO. AFOSR-80-0030

TASK NO. C3

MONITOR: AFOSR
TR-85-0722

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the work which was
completed during the first four years of the research
program (October 1, 1978 to September 30, 1982). Included are:
(1) a NMR and magnetic susceptibility study of
several rapidly quenched Ni-Pd-P, Ni-Pt-P and Ni-P
metallic glasses. (2) a magnetization study of the RE100-
xA15 amorphous alloys (where RE is a rare earth element),
(3) a NMR, magnetization and x-ray diffraction study of
crystalline Fe3-xNi3-xSi1 and Metglas 2605 CO
(Fe87Co18B14Si11), (4) a NMR and magnetic susceptibility
study of the Ca100-xAlx metallic glass system, (5) a
magnetization study of some Co-Nb-B and Fe-Nb-B metallic
glasses, (6) an EXAFS study of Metglas 2605 CO and (7) a
XANES study of the (Ni0.50Pt0.50)75P25 metallic glass
system. In addition, this report described in complete
detail the progress during the past year (October 1, 1983
to September 30, 1984) which includes: (1) a spin-echo
NMR study of the atomic environment in the Fe100-xBx
metallic glass system and (2) a low field magnetization
study of the magnetic anisotropy in Metglas 2605 CO
ribbons. Finally, this report describes the status of
experiments currently in progress which includes: (1)
optical properties of the Ni100-xP metallic glasses and (2)
Mossbauer study of the Metglas 2605 CO system.
Originator supplied keywords include: Electronic
ABSTRACT: (U) Use of body forces to inject energy into a plasma offers certain advantages over simple energy addition by Ohmic heating. To achieve ever-increasing levels of energy per unit mass by this strategy requires detailed and thorough understanding of high-interaction magnetohydrodynamics (HIMHD) through realistic computer simulation. Such simulation is possible by the existing HIMHD codes provided they undergo further validation in the high-interaction regime through systematic experiments. The present work has carried out a critical assessment of several methods for achieving high-interaction, high-magnetic Reynolds number MHD flows. It indicates that continuous flow (as contrasted to pulsed flow) plasmajet-drive MHD devices offer the greatest advantages and potential for validating the STD/MHD codes at high MHD interaction over a wide range of parameters with the greatest confidence. It has led to the definition of specific plasmajet-driven experiments, utilizing existing equipment, as the most effective way to carry out this task. Keywords: Hypervelocity plasmas; High-interaction, High Reynolds number; Simulation codes; and Validation experiments.
ABSTRACT: (U) A modified Rijke burner has been designed and constructed for use in evaluating the influence of particles on acoustic waves. A paddle is used with the burner that can be inserted into the flow field suppressing oscillations on command. Withdrawal of the paddle allows growth of the oscillations. Experimental results obtained using Al and ZrC in the Rijke burner indicate that both additives cause an increase in the acoustic growth rate when compared to growth rates obtained without any particles in the system. The increase caused by Al is greater than that caused by ZrC. Because the reaction of Al releases more than twice the energy ZrC does, it would be expected to have a greater influence on the system than ZrC. The increase in the acoustic growth rate is the result of energy being added to the system by the distributed combustion of the particles. The increase in the acoustic growth rate due to distributed combustion was found to be directly related to the heat of reaction.

DESCRIPTORS: (U) *SOLID PROPELLANT ROCKET ENGINES, *COMBUSTION STABILITY, SOLID ROCKET PROPELLANTS, OSCILLATION, ACOUSTIC ATTENUATION, SUPPRESSORS, ADDITIVES, FREQUENCY, ALUMINUM, ZIRCONIUM COMPOUNDS, CARBIDES, GRAPHITE, ACOUSTIC WAVES, PARTICLES, DAMPING, BURNERS
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY          SEARCH CONTROL NO. EVK15N

AD-A158 859 CONTINUED

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A1

AD-A158 839 6/3

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) The Role of the Extraocular Muscles in the Rabbit
Nictitating Membrane Response: A Re-Examination,
84 9P

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

CONTRACT NO. AFOSR-83-0215

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR

TR-85-0601

UNCLASSIFIED REPORT


ABSTRACT: (U) Berthier and Moore showed that the rabbit
nictitating membrane (NM) response principally results
from contracting the retractor bulbi muscle which pulls
the globe into the socket thereby passively effecting NM
extension. They concluded that the remaining extraocular
muscles an affect NM extension if the retractor bulbi is
denervated. A re-examination of the role of the recti and
oblique extraocular muscles in nictitating membrane
extension was undertaken in the light of recent results
of Marek et al., suggesting that the facial nerve, and
not the extraocular muscles, participates in extension of
the NM. In contrast to Marek et al., the present results
indicated that section of the extraocular muscles was
necessary to abolish eyeshock or tactilily elicited NM
extension when the abducens and facial nerves were
severed. It is therefore likely that extraocular (recti
and oblique) muscles participate in globe retraction and
NM extension, as originally noted by Lorente de No.

DESCRIPTORS: (U) *EYE, *MUSCLES, RABBITS,
NEUROPHYSIOLOGY, REFLEXES, MEMBRANES(BIOLOGY),
CONDITIONED RESPONSE, STIMULATION(NEUROLOGY), REPRINTS

IDENTIFIERS: (U) Extraocular muscles, Nictitating
membrane, Eye blink, Eyelids, WUAFOSR23123A3, PE81102F

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DTIC REPORT BIBLIOGRAPHY

AD-A158 825 17/8 20/5 4/2

FAME ASSOCIATES INC  FORT COLLINS CO

(U) Optical/Infrared Properties of Atmospheric Aerosols with an In-Situ, Multi-Wavelength, Multichannel Nephelometer System.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-14 Mar 85 on Phase I.

APR 85 83P

PERSONAL AUTHORS:  Wedding, J. B.; Kim, Y. U.; Weiland, M. A.

REPORT NO.  FA-AF-14385

CONTRACT NO.  F49620-84-C-0101

PROJECT NO.  3008

TASK NO.  A1

MONITOR:  AFOSR

TR-85-0506

UNCLASSIFIED REPORT

ABSTRACT: (U) There exists a need to develop new instrumentation which can provide an in-situ, real time measurement of the total differential scattering patterns from individual airborne particles of different composition and shape under natural and man-made atmospheric conditions. During the Phase I study, a literature survey was conducted, system requirements developed for an in-situ, multi-wavelength, multichannel nephelometer system, and technical feasibilities were investigated. Finally, design parameters of the nephelometer system including the particle sampling inlet, the optical system, and the data acquisition system were optimized. The proposed nephelometer system will measure the differential scattering patterns of individual aerosol particles at three laser wavelengths, in three scattering planes. Successful development of such an instrument during the Phase II efforts will assist in filling the void of knowledge of the optical/infrared properties of atmospheric aerosols and their interactions with electromagnetic radiation fields. (Author)
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 824 7/4 7/2
PITTSBURGH UNIV PA DEPT OF CHEMISTRY

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

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 80-28 Feb
85,

MAY 85 11P

PERSONAL AUTHORS: Kaufman, F.;

REPORT NO. SO0871-84-00681

CONTRACT NO. AFOSR-80-0207

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-85-0503

UNCLASSIFIED REPORT

ABSTRACT: (U) The vibrational energy transfer of highly
excited HCl and HF was studied by the infrared
chemiluminescence method in a series of five papers.
HCl (v < or = 7) and HF (v < or = 7) were produced by fast
reactions, e.g. H + IC1 yields (v < or = 7) + I
or H + F2 yields (< or = 7) + F in large excess He which
relaxes the rotational but not the vibrational excitation.
With various added quencher gases, about 200 rate
constants for stepwise vibrational energy transfer were
measured. They tend to increase rapidly with increasing v,
only independent of the vibrational energy defect. For
HF (v) + HF (0), self-relaxation, the v-v channel
decreases from 55% at v=2 to zero at v > 5 even though
the relaxation rate constant rises as v to the 2.7 power.

A versatile flow reactor system was built that features
three detection methods (laser-induced fluorescence,
vacuum u.v. resonance fluorescence, and modulated
molecular beam mass spectrometry) plus upstream radical
production by IR laser multiphoton decomposition. The NH2
+ NO and CH3O + NO2 reactions were studied successfully.
The latter was found to have a recombination (CH3NO2)
and disproportionation (CH2O + HN2) channel and both

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVK15N

AD-A158 815 17/2

RANDOM APPLICATIONS INC. MONTROSE CO

(U) Applications of Differential Phase Statistics to Studies of C3 and Spread Spectrum Communications.

DESCRIPTIVE NOTE: Final rep., 85 4P

PERSONAL AUTHORS: Pawula, R. F.;

CONTRACT NO. F49620-83-C-0085

MONITOR: AFOSR
TR-85-0555

UNCLASSIFIED REPORT

ABSTRACT: (U) Three reports have been written under this second year of the contract and are listed in the next section as Papers No. 6, 7, 8. Paper No. 6 addresses the classical and very complicated problem of finding the probability density function at the output of an RC filter when the input is a binary random telegraph signal whose intervals are described by a renewal process. Paper No. 7 focuses on a particular case in which the desired probability density is the solution of a rather formidable third-order differential equation with non-constant coefficients. A closed form solution is found for one special value of a system characteristic parameter, and a series solution is obtained for general values of the this parameter. Paper No. 8 is concerned with developing methods for calculating the solution to a fourth order differential equation. Although the theory of such equations is well known, a prohibitive amount of algebra is required to determine the coefficients in series solutions, and a computer method is developed in which the algebra is circumvented. The method is quite general, and in an appendix is applied to Bessel's differential equation and, quite surprisingly, a new second solution to Bessel's equation is obtained which does not appear to have been previously noticed.

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS,
*SPREAD SPECTRUM, *TELEGRAPH SYSTEMS, ALGEBRA, COMPUTERS,
STATISTICS, VALUE, COEFFICIENTS, VARIATIONS, PROBABILITY
DENSITY FUNCTIONS, SIGNALS, DIFFERENTIAL EQUATIONS,
SOLUTIONS(GENERAL), SERIES(MATHEMATICS),

AD-A158 815

AD-A158 815 CONTINUED

SOLUTIONS(GENERAL), PARAMETERS
L-homocysteate decline steadily between postnatal days 11 to 30, at which time adults values are reached.

ABSTRACT: (U) The effects of excitatory amino acids on Na efflux rate in rat hippocampal slices were determined at various postnatal days and following removal of a major afferent system. Two weeks after a unilateral hippocampal aspiration, the Na efflux induced potassium ions, D-glutamate, N-methylaspartate, and kainate is significantly decreased in the contralateral intact hippocampus whereas the effect of L-glutamate is substantially increased. Analysis of concentration-response curves suggests that the increased responsiveness to L-glutamate is due to an increase in the maximal effect rather than to changes in the half-maximal concentration for the amino acid. Partial denervation does not detectably change efflux elicited by D, L-homocysteic avoid nor does it modify the properties of [3H] glutamate binding to hippocampal membranes. The effects of potassium ions, N-methylaspartate, and kainate but not of D,L-homocysteate are significantly decreased in slices incubated in the absence of calcium. All the amino acids tests are considerably more potent in slices prepared from 11-day-old rats than in those from adult rats, the differences in responsiveness reflect an increase in maximal effect without changes in the half-maximal concentration. The responses to L-glutamate and D,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

UNCLASSIFIED

AD-A158 800 5/10 5/9

NORTHEASTERN UNIV EVANSTON IL

(U) Enhancing Sensitivity to Visual Motion and Enhancing

Visual Sensitivity.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 81-30 Sep 83.

JUN 85 28P

PERSONAL AUTHORS: Sekuler, R.;

CONTRACT NO. AFOSR-80-0248

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR

TR-85-0688

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress made from
October 1, 1981 to September 30, 1983. During this period
work proceeded on three main lines of study: 1) various
aspects of visual motion perception, 2) collaborative
work on contrast sensitivity and pilots' performance in
aircraft simulators, and 3) individual differences in
responses to temporal transients. The most extensive of
the three work-units dealt with motion perception by
human observers. The main findings include the following:
1) Perceived speed of a moving target varies with that
target's contrast and retinal eccentricity. In particular,
many targets undergo illusory slowing when they appear in
the periphery in the visual field. 2) Detection of a
moving target is often dissociated from the ability to
identify the direction in which the target moves. In
particular, the accuracy with which target direction can
be judged, even for highly visible targets, seems to far
less good than previously suspected. 3) Relatively small
amounts of training can significantly improve an
observer's ability to discriminate between two highly
similar directions of target motion. Moreover, this
effect is well-restricted to the training direction and
other, similar directions; the training effect is
retained without decrement for at least two months. The
results suggest that this improvement with training
represents a genuine change in visual function.

AD-A158 800

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AD-A158 800

DESCRIPTIONS: (U) *MOVING TARGETS, *SPACE PERCEPTION,

*VISUAL TARGETS, *VISUAL PERCEPTION, ACCURACY, DETECTION,

HUMANS, OBSERVERS, ECCENTRICITY, RETINA, TARGETS, FLIGHT
SIMULATORS, ORIENTATION(DIRECTION), MOTION, PERCEPTION,
MOTION, SENSITIVITY, VISION, CONTRAST, TRAINING, RESPONSE,
REACTION(Psychology), SKILLS, FLIGHT CREWS, TARGET
DETECTION, DISCRIMINATION, VELOCITY, PERIPHERAL VISION,
OPTIMIZATION

IDENTIFIERS: (U) Individual differences, *Motion
perception, WUAFOSR2312AS, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 799 5/10 6/16
NORTHWESTERN UNIV EVANSTON IL

(U) Enhancing Visual Sensitivity.

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

MAY 85 36P

PERSONAL AUTHORS: Sekuler, R.;

CONTRACT NO. AFOSR-80-0248

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-85-0863

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the major studies carried out under AFOSR grant 80-0248 from October 1, 1983 through September 30, 1984. During this report period we did coordinated work on two aspects of motion perception. One work unit extended our earlier research on how training affects direction discrimination. These studies give new insights into the physiological locus and character of this particular form of perceptual learning. The second work unit exploited perceptual confusions among motion metamer in order to develop a quantitative model of the mechanisms that underlie human direction perception. The model is built around a small number (n=12) of broadly-tuned directionally-selective mechanisms. This model gives an excellent account of the experiments with motion metamer. (Author)

DESCRIPTORS: (U) *LEARNING, *VISUAL PERCEPTION, *SPACE PERCEPTION, DISCRIMINATION, HUMANS, LOCUS, MODELS, MOTION, PERCEPTION, PERCEPTION(PSYCHOLOGY), PHYSIOLOGY, SENSITIVITY, VISION, VISUAL TARGETS, PSYCHOPHYSIOLOGY, SKILLS, PERFORMANCE(HUMAN)

IDENTIFIERS: (U) *Motion perception, Metamerism.

WUAFOSR2312AS, P61102F

AD-A158 799
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DTIC REPORT BIBLIOGRAPHY

AD-A158 794 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Perfluorocycloalkyl(Aryl) Diazenes from
Heptfluoronitrosocyclobutane and
Nonfluoronitrosocyclopentane,
85 11P

PERSONAL AUTHORS: Marsden, H. M.; Shreve, J. M.

CONTRACT NO. AFOSR-82-0247, NSF-CHE81-00158

MONITOR: AFOSR
TR-85-0512

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,

ABSTRACT: (U) The perfluorornitrosocycloalkanes,
heptfluoronitrosocyclobutane and
nonfluoronitrosocyclopentane, are convenient precursors
to a family of new perfluorocycloalkyl(aryl) diazenes.
With aniline and o-aminobenzamide, (CF2)(CF2)2CFN=NC(CH)
4CH and CF2(CF2)2CFN=NC(CH)4CC(CH)4NH2 (x = 2, 3) are formed. Additionally, heptfluoronitrosocyclobutane gives CF2(CF2)
2CFN=NCCFCFCHCFCF and CF2(CF2)2CFN=NC(CH)4CNH2 with 2,3,5,
6-tetrafluoroaniline and o-phenylenediamine.

DESCRIPTORS: (U) *SYNTHESIS (CHEMISTRY), *CYCLIC
COMPOUNDS, *FLUORINE COMPOUNDS, *ALKYL RADICALS, ARYL
RADICALS, NITROSO COMPOUNDS, BUTANES, PENTANES, REPRINTS

IDENTIFIERS: (U) *Diazenes, PE81102F

SEARCH CONTROL NO. EVK15N

AD-A158 793 20/13

RENSSLEAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL
SCIENCES

(U) Dynamics of First Order Phase Transitions,
84 42P

PERSONAL AUTHORS: Siemrod, M.

CONTRACT NO. AFOSR-81-0172

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0543

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Phase Transformations and

ABSTRACT: (U) This paper considers continuum
thermodynamics of first order phase transitions.
Specifically we study the role of viscosity, capillarity,
and heat conduction and the relation of these effects to
interphase wave propagation.

DESCRIPTORS: (U) *PHASE TRANSFORMATIONS, TRANSITIONS,
THERMAL CONDUCTIVITY, CAPILLARITY, VISCOSITY,
THERMODYNAMICS, CONDUCTION (HEAT TRANSFER), ONE
DIMENSIONAL, WAVE PROPAGATION, REPRINTS

IDENTIFIERS: (U) Interphase wave propagation, Continuum
thermodynamics, Phase transitions, WUAFOSR2304A1,
PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 792 21/8.1 21/9.1

PRINCETON UNIV NJ

(U) Criteria for Ignition in Monopropellant Engines,
APR 85 4P

PERSONAL AUTHORS: Benziger, J. B.; Strong, J. E.;

CONTRACT NO. AFOSR-82-0099

PROJECT NO. 2303

TASK NO. D9

MONITOR: AFOSR

TR-85-0533

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Spacecraft and
Rockets, V22 n2 p217-218 Mar-Apr 85.

ABSTRACT: (U) Hydrazine-based monopropellants are a
mature technology. Because of suspected carcinogenicity of
hydrazine the feasibility of nitromethane-based
monopropellants has been studied. Nitromethane-based
systems can deliver high specific impulse; but the high
adiabatic decomposition temperature limits the choice of
catalyst material to metal oxides that exhibit
significant activation barriers for reaction,
necessitating a catalyst bed preheat to function. For two
of the best catalysts, NiO and Cr2O3, a minimum catalyst
bed preheat temperature for ignition was observed.
Furthermore, the response time of the pressure exhaust
and the pressure exhaust time from the catalyst bed was
optimal at intermediate values of fuel flow and catalyst
bed preheat. In this Note we present a model that can
account for these observations and provide guidelines for
operation of nitromethane-based monopropellant systems.
The monopropellant reactor is a packed bed catalytic
reactor. The system is adequately described as an
adiabatic, plug flow, two phase reactor. The two
performance criteria we were interested in were (1) the
operating conditions for lightoff and sustained operation,
and (2) the operating parameters to optimize the response
time. Reactor performance was examined for three design
and control parameters: fuel feed rate, feed temperature,
and bed pre-heat temperature.

AD-A158 792

UNCLASSIFIED
Surface Coordination Chemistry of Platinum Studies by Thin-Layer Electrodes. Adsorption, Orientation, and Mode of Binding of Aromatic and Quinonoid Compounds, 85 10P


PROJECT NO. 2303

UNCLASSIFIED REPORT


ABSTRACT: Extensive studies on the interaction of 54 aromatic and quinonoid compounds with smooth Pt thin-layer electrodes have yielded data that serve to establish the surface coordination chemistry of polycrystalline Pt with these compounds in aqueous solutions. Absorption of the subject compounds occurred spontaneously and irreversibly at specific orientations which depended on their characteristic molecular structures and concentrations, C. These orientations which have been represented in terms of modes of coordination derived from model compounds; supportive electrochemical and infrared spectroscopic data are presented. For simple o- and p-diphenols or quinones, absorption at C < or = 0.1 mM produced flat-oriented (pi-bonded) quinone intermediates; adsorption at C < or = 1 mM resulted in edge-oriented (di-pi-bonded) diphenoic species. When the Pt surface was purposely pretreated with pi-bonded intermediates, severe reorientation retardation was observed, indicating that absorption from concentrated solutions does not involve coordination in the flat orientation as an intermediate step. Substituents on or heteroatoms in the aromatic/quinonoid ring altered its surface coordination properties to varying degrees; analysis of the absorption/orientation data enabled the formulation of a strength-
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 789 7/3
NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) The Reaction of Magnesium with cis-1,3,5-
Tris(Bromomethyl)cyclohexane. Evidence for a Soluble
Tri-Grignard,
85 4P
PERSONAL AUTHORS: Boudjouk, P.; Soorfyakumar, R.; Kapfer,
C. A.;
CONTRACT NO. AFOSR-84-0008
PROJECT NO. 2303
TASK NO. 82
MONITOR: AFOSR
TR-85-0570

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic

ABSTRACT: (U) The reaction of magnesium with cis-1,3,5-
Tris(bromomethyl)cyclohexane in tetrahydrofuran gives
good yields of a soluble tri-Grignard reagent. This
intermediate was characterized by reactions with water,
trimethylchlorosilane and methyltrichlorosilane.

DESCRIPTORS: (U) *SYNTHESIS (CHEMISTRY). *GRIGNARD
REAGENTS. MAGNESIUM. HEXANES. CYCLIC COMPOUNDS. BROMINE
COMPOUNDS, METHYL RADICALS. SILICON COMPOUNDS. REPRINTS

SEARCH CONTROL NO. EVK15N

AD-A158 790 6/18 5/10
NORTHWESTERN UNIV EVANSTON IL

(U) Motion Processing in Peripheral Vision: Reaction Time
and Perceived Velocity.
82 9P
PERSONAL AUTHORS: Tynan, P. D.; Sekuler, R.;
CONTRACT NO. AFOSR-80-0246
PROJECT NO. 2312
TASK NO. A3
MONITOR: AFOSR
TR-85-0607

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v22 p61-68
1982.

ABSTRACT: (U) Reaction time to motion onset were
measured as a function of eccentricity of presentation.
These were compared with measurements of perceived speed
at various eccentricities. For slowly moving targets,
both dependent measures changes substantially with
eccentricity: RT increased and perceived speed declined.
For more rapidly moving targets, both dependent measures
were unchanged by eccentricity. These results may be
related to the difference between retinotopic
distribution of neural mechanisms responsive to low rates
of temporal modulation and the retinotopic distribution of
neural mechanisms responsive to higher rates of temporal
modulation.

DESCRIPTORS: (U) *PERIPHERAL VISION, VISUAL PERCEPTION,
REACTION TIME, ECCENTRICITY, VELOCITY, MOTION, SIMULATION,
IMAGE PROCESSING, MOVING TARGETS, RETINA, PSYCHOPHYSICS.
REPRINTS

IDENTIFIERS: (U) Motion analysis, WUAFOSR2312A3,
PEG1102F
UNCLASSIFIED

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<td>(U) Detection and Identification of Moving Targets.</td>
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<td>83 11P</td>
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<td>PERSONAL AUTHORS: Ball,K.; Sekuler,R.; Machamer,J.;</td>
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<td>FLORIDA UNIV GAINESVILLE</td>
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<td>(U) Far-Field Boundary Conditions in Numerical Solutions of the Navier-Stokes Equations.</td>
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<td>DESCRIPTIVE NOTE: Final rept. 24 Oct 84-1 Apr 85, May 85 61P</td>
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<td>PERSONAL AUTHORS: McKenna, P. J.;</td>
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<td>CONTRACT NO. AFOSR-83-0330</td>
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<td>TASK NO. A3</td>
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<td>ABSTRACT: (U) Though they could distinguish a moving target from a blank field, subjects in earlier work often greatly misperceived the direction of the movement. This observation was followed up in three experiments comparing detection of moving random-dot patterns to identification of the patterns’ direction of movement. Two different theoretical treatments indicate that in order to be detected by entirely independent mechanisms, two directions must differ by at least 120 deg.</td>
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<td>DESCRIPTORS: (U) *VISUAL PERCEPTION, *MOVING TARGETS, SPACE PERCEPTION, DETECTION, DISCRIMINATION, PERCEPTION/PSYCHOLOGY, IDENTIFICATION, VISUAL TARGETS, MOTION, DIRECTIONAL, PERFORMANCE(HUMAN), REPRINTS</td>
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<td>IDENTIFIERS: (U) Motion perception, WUAFOSR2312A3, PEB1102F</td>
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<td>ABSTRACT: (U) The purpose of this project was to investigate the artificial boundary conditions which must be imposed at the boundary of a numerical grid. Numerical experiments were performed which evaluated various boundary conditions of this type. Of particular interest was the question of whether linearization around the flow at infinity provides an adequate choice of boundary condition for the fully nonlinear equations. Inflow-outflow conditions as well as several choices of periodic boundary conditions were considered. The inflow-outflow conditions worked reasonably well for two dimensional problems. For the periodic conditions, results were mixed. Concerns about over specification when using pure periodic conditions proved to be groundless. However, the method failed when attempting to use periodicity in the two sideways traveling periodic waves. Additional keywords: Computational fluid dynamics; Fluid flow; Two dimensional flow; Compressible flow.</td>
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<td>DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, *BOUNDARY VALUE PROBLEMS, BOUNDARIES, COMPRESSIBLE FLOW, FAR FIELD, LINEARITY, NONLINEAR ALGEBRAIC EQUATIONS, GRIDS, NUMERICAL ANALYSIS, TWO DIMENSIONAL FLOW, FLUID FLOW, NUMERICAL METHODS AND PROCEDURES, SOLUTIONS(GENERAL), TWO DIMENSIONAL, PERIODIC VARIATIONS, TRAVELING WAVES, COMPUTATIONS, FLUID DYNAMICS</td>
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DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N
AD-A158 769  7/4  20/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES CENTER FOR LASER STUDIES

(U) Subnanosecond Short Wavelength Generation Using Optical Fibers.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 84.
FEB 85 17P

PERSONAL AUTHORS: Garmire, E.;

CONTRACT NO. F49620-84-C-0016

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0491

UNCLASSIFIED REPORT

ABSTRACT: (U) A one-year study of nonlinear optical effects in fibers using UV lasers investigated stimulated Raman scattering. Lines were seen due to quartz in fibers and due to organic liquids in liquid-filled capillaries. Benzene formed a waveguide, but in preliminary experiments only 1% was converted to stimulated Stokes scattering. Of particular interest was the discovery of Raman scattering of the Nitrogen laser light from the nitrogen vibrational transitions within the laser itself. Such lines have never been reported before. Of additional interest was the multi-line spectral broadening of the stimulated Raman spectra observed from quartz fibers. The reason for this broadening remains to be investigated. Preliminary experiments were performed and apparatus designed which sets the stage for further research into the higher power UV properties of fibers. Keywords include: UV, optical fibers, waveguides, nonlinear optics, and stimulated Raman effect.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *FIBER OPTICS, *RAMAN SPECTRA, *ULTRAVIOLET LASERS, BENZENE, LASERS, NITROGEN, TRANSITIONS, VIBRATION, OPTICS, PULSES, QUARTZ, LIGHT SCATTERING, RAMAN SPECTRA, HIGH POWER, ULTRAVIOLET RADIATION, LASER BEAMS, NITROGEN LASERS, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, FIBERS, STIMULATION (GENERAL),...
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 762 12/1

WISCONSIN UNIV-MILWAUKEE

(U) Sieves and a Filter for Gaussian Processes. APR 85 5P

PERSONAL AUTHORS: Beder, J. ;

CONTRACT NO. AFOSR-84-0329

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0821

UNCLASSIFIED REPORT

ABSTRACT: (U) Results are reported on the first two conjectures that were to be investigated as described in the research proposal. Conjecture 1 has been established and follow-on results are obtained. What remains to be investigated is the use of these results to make confidence statements and to test hypotheses. Results which establish the truth of conjecture 2 are also reported. Additional keywords: Theorems; Estimates; Covariance; Convergence. (Author)

DESCRIPTORS: (U) *MATHEMATICAL ANALYSIS, HYPOTHESES,
THEOREMS, ESTIMATES, COVARIANCE, CONVERGENCE

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

AD-A158 769  CONTINUED

WAVEGUIDES

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A1
ABSTRACT: (U) We argue that one of the early goals of color vision is to distinguish one kind of material from another. Accordingly, we show that when a pair of image regions is such that one region has greater intensity at one wavelength than at another wavelength, and the second region has the opposite property, then the two regions are likely to have arisen from distinct materials in the scene. We call this material change circumstance the 'opposite slope sign condition.' With this criterion as a foundation, we construct a representation of spectral information that facilitates the recognition of material changes. Our theory has implications for both psychology and neurophysiology. In particular, Hering's notion of opponent colors and psychologically unique primaries, and Land's results in two-color projection can be interpreted as different aspects of the visual system's goal of categorizing materials. Also, the theory provides two basic interpretations of the function of double-opponent color cells described by neurophysiologists. Keywords include: Image understanding; Vision; Color vision; Color theory.

DESCRIPTORS: (U) COLOR VISION, COLORS, THEORY, MATERIALS, IMAGES, REGIONS, RECOGNITION, VISION, FREQUENCY, INTENSITY, NEUROPHYSIOLOGY, PSYCHOLOGY, SPECTRA, DISCRIMINATION, IMAGE PROCESSING, VISUAL
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 744  12/1

MASSACHUSETTS INST OF TECH  CAMBRIDGE ARTIFICIAL
INTELLIGENCE LAB

(U) Codon Constraints on Closed 2D Shapes.

MAY 84  25P

PERSONAL AUTHORS:  Richards, W. A.; Hoffman, D. D.

REPORT NO.  AI-M-789

CONTRACT NO.  F49620-83-C-0135

PROJECT NO.  2313

TASK NO.  A5

MONITOR:  AFOSR

TR-85-0588

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT:  (U) Codons are simple primitives for
describing plane curves. They thus are primarily image-
based descriptors. Yet they have the power to capture
important information about the 3D world, such as making
part boundaries explicit. The codon description is highly
redundant (useful for error-correction). This redundancy
can be viewed as a constraint on the number of possible
codon strings. For smooth closed strings that represent
the bounding contour (silhouette) of many smooth 3D
objects, the constraints are so strong that sequences
containing 6 elements yield only 33 generic shapes as
compared with a possible number of 15,625 combinations.

An important task for object recognition is the
description of the shape of a bounding contour such as a
silhouette that outlines an object. Although recognition
need require only partial segments of such contours, the
internal canonical description, against which the image
contour is compared, is very likely a closed ring. Our
concept of most objects should lead us to expect such a
closed contour. The description of closed, 2D contours
thus is an important ingredient of a system for object
recognition. First the author present such a scheme,
described in more detail elsewhere and then show how the
scheme leads to a hierarchical taxonomy of closed, 2D
shapes. Additional keywords:  Image understanding; Shape
representation; Applied mathematics; Artificial
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 740 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Basic Properties of Strong Mixing Conditions.

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

JUN 85 41P

PERSONAL AUTHORS: Bradley, R. C.

REPORT NO. TR-102

CONTRACT NO. F49620-82-C-0009, NSF-DMS84-01021

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0819

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Indiana Univ., Bloomington, Dept. of Mathematics.

ABSTRACT: (U) This is a survey of the basic properties of strong mixing conditions for sequences of random variables. The focus will be on the structural properties of these conditions, and not at all on limit theory. For a discussion of central limit theorems and related results under these conditions, the reader is referred to Peligrad or Iosifescu. This survey will be divided into eight sections as follows: 1) Measures of dependence; 2) Five strong mixing conditions; 3) Mixing conditions for two or more sequences; 4) Mixing conditions for Markov chains; 5) Mixing conditions for Gaussian sequences; 6) Some other special examples; 7) The behavior of the dependence coefficients; and 8) Approximation of mixing sequences by other random sequences. Additional keyword: Stationary. (Author)

DESCRIPTORS: (U) *MIXING, *RANDOM VARIABLES, MARKOV PROCESSES, SEQUENCES, STRUCTURAL PROPERTIES, THEORY, APPROXIMATION(MATHEMATICS), STATIONARY

IDENTIFIERS: (U) Strong mixing conditions, Markov chains.

AD-A158 740 CONTINUED

Gaussian sequences, MUAF085R2304A5, PE81102F

AD-A158 740

UNCLASSIFIED PAGE 179 EVK15N
ABSTRACT: (U) This study shows that when a point process is partitioned into certain uniformly sparse subprocesses, then the subprocesses are asymptotically multivariate Poisson or compound Poisson. Bounds are given for the total-variation distance between the subprocesses and their limits. Several partitioning rules are considered including independent, Markovian, and batch assignments of points. Additional keywords: Weak convergence; Theorems. (Author)

DESCRIPTORS: (U) *POINTS(MATHEMATICS), POISSON DENSITY FUNCTIONS, APPROXIMATION(MATHEMATICS), MULTIVARIATE ANALYSIS, WEAK CONVERGENCE, THEOREMS

IDENTIFIERS: (U) *Partitions(Mathematics), *Partitioning, WUAFOSR2304A5, PE811002F

ABSTRACT: (U) The target duration required for the precise discrimination of velocity is quite short, amounting to about 100 msec for a single moving dot or line target. While stroboscopic motion is an adequate substitute for continuous motion in velocity discrimination, optimal discrimination depends on the use of a strobe rate greater than 10 Hz. Generally human observers have difficulty detecting acceleration in moving targets. Over small distances (0.5-1 deg), timing signals from adjacent targets presented in a sequence are pooled, so that information about their relative onset time is lost. For example, given three adjacent lines, separated spatially by 0.1 deg and presented in a sequence (apparent motion) observers are unable to discriminate between a sequence in which a 10 msec interval separates the second from the reverse order (30 msec followed by 10 msec). Velocity discrimination is not affected by blur. Sinusoidal grating targets of 3 cyl/deg or lower produce excellent discrimination. Sinusoidal gratings above 3 cycles per degree in spatial frequency are not adequate for fast velocities (> 1 deg/sec). Keywords: Motion human performance; Velocity discrimination; Acceleration detection vision.

DESCRIPTORS: (U) *DISCRIMINATION, *VISUAL PERCEPTION,
ACCELERATION, DETECTION, VISION, MOTION, VELOCITY,
TARGETS, MOVING TARGETS, PRECISION, HUMANS, OBSERVERS,
PERFORMANCE (HUMAN), OPTIMIZATION, FREQUENCY, SPATIAL
DISTRIBUTION, RATES, STROBOSCOPES, SIGNALS, TIME

IDENTIFIERS: (U) Velocity discrimination, Acceleration
detection, Motion detection, Apparent motion,
WUAFOSR2313A5, PE81102F

ABSTRACT: (U) During the past year the research effort
was concentrated on the rapidly pulsed laser-plasma x-ray
source. The effort was divided into three areas:
developing the source and system, studying improved
diagnostic, and making accurate x-ray measurements over a
parameter matrix.

DESCRIPTORS: (U) LITHOGRAPHY, HIGH RESOLUTION, LASERS,
MEASUREMENT, PLASMAS (PHYSICS), SOURCES, X RAYS, PULSED
LASERS

IDENTIFIERS: (U) X ray sources, WUAFOSR2301A8, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 732  5/10  8/16
WASHINGTON UNIV  ST LOUIS MO BEHAVIOR RESEARCH LAB

(U) A Psychophysiological Mapping of Cognitive Processes.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Mar 84-28 Feb 85,
APR 85 49P

PERSONAL AUTHORS: Goldstein, R.; Stern, J.; Bauer, L.;

REPORT NO. 0059-85-1
CONTRACT NO. F49620-83-C-0059
PROJECT NO. 2313
TASK NO. A4

MONITOR: AFOSR
TR-85-0684

UNCLASSIFIED REPORT

ABSTRACT: (U) The experiment was concerned with the
effects of varied cognitive and perceptual (i.e.,
monitoring) demands on patterns of physiological
responding. Cognitive demands were varied by manipulating
the number of letters (1, 3, or 5) comprising a briefly-
presented set which the subject was instructed to encode,
rehearse, and, 5 sec later, compare to a single test
letter. Perceptual demands were varied by presenting the
subject with a cue stimulus 5 sec prior to the set,
informing him of the number of letters contained therein.
Several physiological measures were recorded, including
HR, EOG and 'probe' evoked potentials sampled from the
intervals preceding and following the letter set, and
'task' evoked potentials and blinks elicited by the cue,
letter set, and test stimuli. Performance data, i.e., RT
and error rates, were also recorded.

DESCRIPTORS: (U) *PSYCHOPHYSIOLOGY, *COGNITION,
*MEMORY(PSYCHOLOGY), VISUAL PERCEPTION, CUES(STIMULI),
PERCEPTION(PSYCHOLOGY), REACTION TIME, REFLEXES, PATTERN
RECOGNITION, EYE, BRAIN, HEART RATE, MONITORING,
AMPLITUDE, PERFORMANCE(HUMAN), ELECTROOCULOGRAPHY,
ELECTROENCEPHALOGRAPHY

IDENTIFIERS: (U) ERP(Event Related Potentials), Evoked

AD-A158 732  5/10  8/16

CONTINUED

AD-A158 732

potentials, Eye blink. Short term memory, PE81102F.
WJAFOSR2313A4
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 731 9/5 20/10
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB
(U) Joint Services Electronics Program.

DESCRIPTIVE NOTE: Annual rept. 1 May 84-28 Feb 85,
APR 85 11P
PERSONAL AUTHORS: Oldham, W. G.
REPORT NO. UCB/ERL-85-1
CONTRACT NO. F48620-84-C-0057
PROJECT NO. 2305
TASK NO. A9
MONITOR: AFOSR
TR-85-0669

UNCLASSIFIED REPORT

ABSTRACT: (U) An annual report of the JSEP (Joint Services Electronics Program) in Electromagnetics, Solid State Electronics, Materials and Devices, Quantum Electronics and Information Sciences is presented. In addition, results of the research to date are summarized and significant accomplishments are indicated. Keywords include: Electromagnetics, Solid state electronics; Materials and devices, Quantum electronics, information and control systems, and Circuits.

DESCRIPTORS: (U) *QUANTUM ELECTRONICS, *SOLID STATE ELECTRONICS, CONTROL SYSTEMS, INFORMATION SCIENCES
IDENTIFIERS: (U) PE81102F, WUAFOSR2305A9

AD-A158 728 4/1

SEARCH CONTROL NO. EVK15N

UNCLASSIFIED REPORT

AD-A158 726

PHYSICAL DYNAMICS INC BELLEVUE WA
(U) Studies of Gravity Wave Propagation in the Middle Atmosphere.

DESCRIPTIVE NOTE: Annual rept. 11 Feb 84-11 Feb 85,
MAR 85 24P
PERSONAL AUTHORS: Dunkerton, T. J.
REPORT NO. PD-NW-85-330R
CONTRACT NO. F48620-83-C-0061
PROJECT NO. 2310
TASK NO. A1
MONITOR: AFOSR
TR-85-0505

UNCLASSIFIED REPORT

ABSTRACT: (U) Research represents an effort to understand the role of gravity waves in the general circulation of the atmosphere. Such waves exist on a wide range of scales and frequencies. In this report, we describe ray tracing of gravity waves of horizontal scales from 50 to 800 km, all of which are observed in the middle atmosphere and play an essential role in the transport of momentum and mixing of constituents. Also presented are numerical simulations of gravity wave, mean-flow interaction, focusing on two aspects of this process: saturation and self-acceleration. Model results are compared to the predictions of a semi-analytic model of gravity waves. Finally, the report concludes with a discussion of constituent mixing in gravity wave breakdown, and problems in this area meriting further study.

DESCRIPTORS: (U) *GRAVITY WAVES, MIXING, MESOSPHERE, RAY TRACING, RANGE (EXTREMES), SCALE, CIRCULATION, HORIZONTAL ORIENTATION, NUMERICAL ANALYSIS, MOMENTUM, TRANSPORT
IDENTIFIERS: (U) PE81102F, WUAFOSR2310A1

AD-A158 731

UNCLASSIFIED PAGE 183 EVK15N
UNCLASSIFIED

SUPPLEMENTARY NOTE: Pub. In Cognitive Psychology, v18  

ABSTRACT: (U) Event-related brain potentials (ERPs) were  
elicted by words in a free recall paradigm that included  
a novel item. The P300 component of the ERP is elicited  
by novel, task-relevant events, and we tested the  
hypothesis that P300 is manifestation of the cognitive  
processing invoked during context updating. If the degree  
to which current representations in working memory need  
revision is related to P300 amplitude, then the P300  
elicted by a given item should be related to the ability  
to recall that item on a subsequent test. Forty lists  
were presented to 12 subjects in each of two sessions.  
The lists were 15 words long, and 1 word, in position 8  
through 10, was isolated by changing its size. Most  
subjects recalled these isolated words more often than  
other words in the same positions (von Restorff effect),  
and these words also elicited larger P300s than other  
words. Analysis of variance on the component scores from  
a principal components analysis revealed that words  
recalled had a large amplitude P300 (on initial  
presentation) than words not recalled. Striking  
individual differences emerged, and there were strong  
relationships between the von Restorff effect, overall  
recall performance, mnemonic strategies, and the  
association between components of the ERP and recall  
performance.
ABSTRACT: (U) Problems requiring the synthesis of a collection of plans accomplishing distinct (but possibly related) goals has received increasing attention within artificial intelligence. Such problems are typically formulated as multi-agent planning problems, emphasizing a problem decomposition wherein individual agents assume responsibility for the generation of individual plans while taking into account the goals and beliefs of other agents in the system. One consequence of such a problem decomposition is a simplified view of resource allocations that assumes avoidance of conflicts to be the sole concern. The validity of this assumption comes into question in time constrained problem domains requiring the allocation of multiple, shared resources. In job shop scheduling for example, where sequences of manufacturing operations must be determined and scheduled for multiple orders, it is necessary to consider much more than availability to efficiently allocate resources over time. This document argues that in such domains, an ability to reason from both resource-based and agent-based perspectives is essential to appropriate consideration of all domain constraints.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *PLANNING, *TIME, JOB SHOP SCHEDULING, DECOMPOSITION, RESOURCES, SHARING, COLLECTION, PROBLEM SOLVING, ALLOCATIONS, RESOURCE MANAGEMENT, MANUFACTURING, OPERATION, SEQUENCES,
Syntheses of Heptafluoro nitrosocyclo-butane and Nonfluoro nitrosocyclo-pentane and Their Reactions with Tetrafluoroethylene, 1,3-Hexafluorobutadiene, and Tetrafluorohydrazine.
(U) The Effects of Various Catalysts in the In-Situ Precipitation of Reinforcing Silica in Polydimethylsiloxane Networks,
84 10P
PERSONAL AUTHORS: Jiang, C. Y.; Mark, J. E.;
CONTRACT NO. AFOSR-83-0027
PROJECT NO. 2303
TASK NO. A3
MONITOR: AFOSR TR-85-0515


ABSTRACT: (U) A variety of inorganic and organic acids, bases, and salts were studied as catalysts for the hydrolysis of tetraethyl orthosilicate, the reaction previously employed for the precipitation of silica within already-cured elastomeric networks of polydimethylsiloxane. These substances were compared with regard to the amount of silica precipitated at room temperature, and the extent of reinforcement as judged by the upturns in the stress-strain isotherms at high elongations. On this basis, the acids were the least effective and the salts the most effective.

DESCRIPTORS: (U) *CATALYSTS, *HYDROLYSIS, *ELASTOMERS, POLYMERS, METHYL RADICALS, SILICONES, SILICON DIOXIDE, PRECIPITATION, REPRINTS

IDENTIFIERS: (U) Siloxane/Polydimethyl, PE61102F, WUAFOSR2303A3

(U) An Analysis of the Processing Requirements of a Complex Perceptual-Motor Task,
DEC 83 26P
PERSONAL AUTHORS: Kramer, A. F.; Wickens, C. D.; Donchin, E.;
CONTRACT NO. F49620-79-C-0233
PROJECT NO. 2313
TASK NO. A4
MONITOR: AFOSR TR-85-0605


ABSTRACT: (U) Current concerns in the assessment of mental workload are discussed, and the event-related brain potential (ERP) is introduced as a promising mental-workload index. Subjects participated in a series of studies in which they were required to perform a target acquisition task while also covertly counting either auditory or visual probes. The effects of several task-difficulty manipulations on the P300 component of the ERP elicited by the counted stimulus probes were investigated. With sufficient practiced subjects the amplitude of the P300 was found to decrease with increases in task difficulty. The second experiment also provided evidence that the P300 is selectively sensitive to task-relevant attributes. A third experiment demonstrated a convergence in the amplitude of the P300s elicited in the simple and difficult versions of the tracking task. The amplitude of the P300 was also found to covary with the measures of tracking performance. The results of the series of three experiments illustrate the sensitivity of the P300 to the processing requirements of a complex target acquisition task.

DESCRIPTORS: (U) *PERCEPTION(PSYCHOLOGY), *INFORMATION PROCESSING, COGNITION, PSYCHOPHYSIOLOGY, BRAIN, AUDITORY
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 713 5/10 6/18

ILLINOIS UNIV CHAMPAIGN

(U) Performance of Concurrent Tasks: A Psychophysiological Analysis of the Reciprocity of Information-Processing Resources.

DESCRIPTIVE NOTE: Journal article,

SEP 83 5P


CONTRACT NO. F49620-78-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR

TR-85-0591

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v221 p1080-1082. 9 Sep 83.

ABSTRACT: (U) The resources allocated to a primary and secondary task are reciprocal. Subjects performed a tracking task in which the discrete displacements of the tracking cursor could be used to elicit event-related brain potentials. As the resource demands of the tracking task were increased, potentials elicited by the task-defined events increased in amplitude, whereas those elicited by secondary task auditory stimuli decreased. (Author).

DESCRIPTORS: (U) *PSYCHOPHYSIOLOGY, *INFORMATION PROCESSING, ELECTROENCEPHALOGRAPHY, CORRELATION, BRAIN, TRACKING, PERCEPTION (PSYCHOLOGY), MEMORY (PSYCHOLOGY), REPRINTS

IDENTIFIERS: (U) ERP (Event Related Potentials), P300, PE61102F, WJAFOSR231A4

ABSTRACT: (U) To delineate age- and gender-related differences in physiological responses to cold exposure, men and women between the ages of 20 and 29 yr and 51 and 72 yr, wearing minimal clothing, were exposed at rest for 2 h to 20, 20, 15, and 10 C room temperatures with 40% relative humidity. The data suggest that older men are more susceptible to cold ambient than younger people, since they did not prevent a further decline in their initially relatively low rectal temperature. Despite greater insulation from body fat, the older women maintained a constant rectal temperature at greater metabolic cost than men or younger women.

DESCRIPTORS: (U) *BODY TEMPERATURE, *TEMPERATURE CONTROL, *LOW TEMPERATURE, PHYSIOLOGICAL EFFECTS, HUMAN BODY, MALES, FEMALES, COMPARISON, METABOLISM, RATES, REPRINTS

IDENTIFIERS: (U) Age factor, PEB1102F, WUAF0SR2312A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 706  CONTINUED

PERFORMANCE (HUMAN), SIMULATION, BEHAVIOR,
ELECTROENCEPHALOGRAPHY, AMPLITUDE, PREDICTIONS, REPRINTS

IDENTIFIERS: (U) ERP (Event Related Potentials), P300,
Orienting reflex, PE61102F, WA0602R2313A4

AD-A158 692  CONTINUED

SEARCH CONTROL NO. EVK15N

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Fuels Combustion Research.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 82-28 Feb 83,
NOV 83 144P

PERSONAL AUTHORS: Dryer, F. L.; Glassman, I.; Williams, F. A.

REPORT NO. MAE-1640

CONTRACT NO. F49620-82-K-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0499

UNCLASSIFIED REPORT

ABSTRACT: (U) A qualitative mechanism of aromatic
oxidation has been developed and is of significant
importance for the understanding of soot processes and
combustor modelling. Kinetic results on toluene and ethyl
benzene have elucidated how aromatic side chains are
oxidized and contribute further towards developing
overall mechanisms for combustor modellers. Extensive
results on fuel pyrolysis rates have been obtained. These
results reveal that pyrolysis rates alone do not control
sooting intensity, but also the pyrolysis reveal that
pyrolysis rates alone do not control sooting intensity,
but also the pyrolysis intermediates formed. A complete
phenomenological model of soot formation has been
developed and refined by comparison with the experimental
results. This model has permitted the identification of
the phenomena controlling soot formation in both premixed
and diffusion flame combustion systems and has great
immediate practical applications. In particular, lengthy
experimentation has shown that the combustion temperature
is one of the most significant parameters in determining
sooting tendencies in both diffusion and premixed flame
situations with temperature as a controlled parameter the
real effect of fuel type can be determined. A reliable
generator of well characterized suspensions of boron slurries has been designed and constructed. Two significant new findings with respect to the ignition combustion of boron particles have been reported. The theoretical work on turbulent combustion has treated both premixed and diffusion flames by asymptotic methods.

**DESCRIPTORS:** (U) COMBUSTION, FUELS, SOOT, AROMATIC COMPOUNDS, BENZENE COMPOUNDS, BORON, COMPARISON, CONTROL, DIFFUSION, ETHYL RADICALS, FLAMES, GENERATORS, IGNITION, MIXING, MODELS, OXIDATION, PARAMETERS, PARTICLES, PYROLYSIS, RELIABILITY, THEORY, TOLUENES, TURBULENCE, BURNING RATE, SLURRY FUELS, ASYMPTOTIC NORMALITY, COMBUSTORS, KINETICS, BORON OXIDES, DENSITY

**IDENTIFIERS:** (U) WUAF09R2308A2, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 688  12/1
CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) Random Search for a Probable Object.

DESCRIPTIVE NOTE: Technical rept.,
JUN 85 21P

PERSONAL AUTHORS: Jewell, W. S.;

REPORT NO. ORC-85-5

CONTRACT NO. AFOSR-81-0122

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0802

UNCLASSIFIED REPORT

ABSTRACT: (U) A search is undertaken for an object thought to be present with an unknown probability, using a detection scheme whose efficiency is also uncertain. After a certain interval, the search is called off, with the object unfound; what are the posterior-to-experiment estimates of presence and detection efficiency? It is shown that those two unknown quantities interact in an interesting manner as the unsuccessful search goes on. Additional keywords: Bayesian estimation; mathematical models; Charts. (Author)

DESCRIPTORS: (U) *SEARCHING, BAYES THEOREM, ESTIMATES, DETECTION, PROBABILITY, EFFICIENCY, MATHEMATICAL MODELS

IDENTIFIERS: (U) *Random searching, PE61102F

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVK15N

AD-A158 678  5/10
NORTHWESTERN UNIV EVANSTON IL

(U) A Specific and Enduring Improvement in Visual Motion Discrimination.

NOV 82 4P

PERSONAL AUTHORS: Ball, K.; Sekuler, R.;

CONTRACT NO. AFOSR-80-0246

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-85-0604

UNCLASSIFIED REPORT


ABSTRACT: (U) Training improves the ability of human observers to discriminate between two similar directions of motions. This gradual improvement is specific to the direction on which an observer is trained, and it endures for several months. Improvement does not affect motion perception generally, nor does it depend on recognition of details of the movement.

DESCRIPTORS: (U) *VISION, *MOTION, *DISCRIMINATION, OBSERVATION, OBSERVERS, RECOGNITION, ORIENTATION(DIRECTION), REPRINTS

IDENTIFIERS: (U) Visual motion, WUAFO8R2312A3, PE61102F
UNCLASSIFIED

AD-A158 671  7/3
WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY
(U) Formation of a Disiloxirane in the Oxidation of 1,2-Dimethyl-1,2-di-t-Butyldisilaethylenes, 84 3P
PERSONAL AUTHORS: Michalczyk, M. J.; West, R.; Michl, J.
CONTRACT NO. F49620-83-C-0044
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR TR-85-0573

UNCLASSIFIED REPORT
ABSTRACT: (U) Reaction of trans-1, 2-di-t-butyl-1,2-dimethyldisilane in solution with dioxygen at -78 C produces the disiloxirane and a compound believed to be the 1,2-disiladioxetane; the latter compound rearranges quantitatively to the known 1,3-cyclopropylsiloxane above 0 C. (Author)
DESCRIPTORS: (U) *SYNTHESIS(chemistry), *SILICON COMPOUNDS, *ORGANIC COMPOUNDS, *OXIDATION REDUCTION REACTIONS, OLEFIN POLYMERS, CHEMICAL BONDS, OXETANES, REPRINTS
IDENTIFIERS: (U) *Disiloxirane, Dioxetane/1,2-disila, Silaethylene(di)/1,2, Dimethyl-1,2, -di-t-butyl, Disilenes, PE81102F, WUAFOSR2303B2

AD-A158 653  3/2
STEWARD OBSERVATORY TUCCSON ARIZ
(U) Speckle Image Reconstruction.
DESCRIPTIVE NOTE: Final rept. 1 Oct 81-31 Mar 85.
APR 85 33P
PERSONAL AUTHORS: Strittmatter, P. A.; Hege, E. K.
CONTRACT NO. AFOSR-82-0020
PROJECT NO. 2311
TASK NO. A1
MONITOR: AFOSR TR-85-0635

UNCLASSIFIED REPORT
ABSTRACT: (U) This report contains results obtained from observations using the University of Arizona 2.3 meter telescope, the Kitt Peak National Observatory 4 meter telescope and the multiple mirror telescope. Work Done Included: High Resolution Imaging Potential of WNT; Earth Satellite Observations; Asteroid/Planetary Satellite Measurements; and Image Reconstruction Experiments; Scientific Accomplishments pertained to; Asteroid/ Planetary Science; Red Supergiants - Limb Darkening and Extended Atmosphere; Binary Stars; Active Galactic Nuclei; and QSO Images. (Author)
DESCRIPTORS: (U) *IMAGE PROCESSING, *STARS, STELLAR ATMOSPHERES, TELESCOPES, ARIZONA, SPECULAR REFLECTION, ATMOSPHERES, PLANETOLOGY, ASTEROIDS, IMAGES, BINARY STARS, NUCLEI, GALAXIES
IDENTIFIERS: (U) Image reconstruction, Red giants, PE81102F, WUAFOSR2301A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 647  7/4  21/2

YALE UNIV  NEW HAVEN CT DEPT OF CHEMICAL ENGINEERING

(U) Interfacial Chemical Reactions and Transport Phenomena
in Flow Systems.

DESCRIPTIVE NOTE:  Final rept.  1 Dec 81-30 Nov 83,
JAN  84  21P

PERSONAL AUTHORS:  Rosner, D. E. ;

PROJECT NO.  F49620-82-K-0020
PROJECT NO.  2308

TASK NO.  A2
MONITOR:  AFOSR
TR-85-0482

UNCLASSIFIED REPORT

ABSTRACT:  (U) This report summarizes Yale-High
Temperature Chemical Reaction Engineering Laboratory
methods/results for the two-year period ending 11/30/83.
Note-worthy findings on interfacial chemical reactions
and mass transport include:  (1) thermal (Soret) mass
transfer can systematically enhance H2-transport rates to
catalytic combustion surfaces by up to 20% in forced
convection systems;  (2) For submicron particle transport
(MgO) to cold surfaces in hot combustion gases
thermophoresis causes about a 2000-fold increase in the
deposition rate (over that expected from convective-
(Brownian)diffusion);  (3) By accounting for the suction
and apparent-source effects associated with
thermophoresis within particle laden nonisothermal
boundary layers (BLs) simple rational engineering
correlations have been proposed and verified via
numerical laminar and turbulent BL-boundary calculations;
(4) Quantitative, rapid-response measurements of solid
gasification kinetics have now been made using an
adaptation of microwave-induced-plasma emission
spectroscopy.  This technique, shown to follow Pt-atom
fluxes down to ca. 2 10 to the 13th power atm/sq cm/s,
appears to be promising for studying the oxidation
kinetics of boron.  Originator supplied keywords include:
Aerosols.  Convective diffusion, Combustion, Deposition,
Energy transfer, Fouling, Heterogeneous Catalysis, Flow

reactors, Inertial impactation, Optical methods, Soot,
Thermal diffusion, Thermophoresis and turbine blades.

DESCRIPTORS:  (U)  *COMBUSTION, *HYDROGEN, *CHEMICAL
REACTIONS, *MASS TRANSFER, AEROSOLS, CATALYSTS, SURFACES,
DEPOSITION, ENERGY TRANSFER, CONVECTION, BOUNDARY LAYER,
LOW TEMPERATURE, DIFFUSION, RATES, FLOW, FOULING,
TRANSPORT PROPERTIES, HETEROGENEITY, INTERFACES,
PARTICLES, SOOT, THERMAL DIFFUSION, TURBINE BLADES, HOT
GASES, BORON, KINETICS, OXIDATION, ENERGY CONVERSION,
GASES, KINETICS, SOLIDS, TRANSPORT

IDENTIFIERS:  (U) Thermophoresis, PE61102F, WUAFWAL2308A2

AD-A158 647  CONTINUED

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PAGE 194  EVK15N
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DTIC REPORT BIBLIOGRAPHY

AD-A158 644 12/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Information in Censored Models.

DESCRIPTIVE NOTE: Technical rept.

JUN 85 25P

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

REPORT NO. FSU-STATISTICS-M701, TR-85-177-AFOSR

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0817

UNCLASSIFIED REPORT

ABSTRACT: (U) Criteria are developed for measuring
information in the randomly right-censored model.
Measures which are appropriate include an extension of
Shannon's entropy. The measures are seen to satisfy some
fundamental theorems including (i) the uncensored case is
always at least as informative as any censored model, (ii)
information decreases as censoring increases
stochastically, and (iii) the information gain is
marginally decreasing. Additional keywords: random
variables; statistical inference.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *INFORMATION
THEORY, ENTROPY, MEASUREMENT, GAIN, RANDOM VARIABLES,
CENSORSHIP, STOCHASTIC PROCESSES

IDENTIFIERS: (U) Shannons' Entropy, PEG1102F,
WUAFOSR23044A5

UNCLASSIFIED REPORT

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

ABSTRACT: (U) For systems of semilinear parabolic
partial differential equations on bounded domains with
large diffusivity and homogeneous boundary conditions
close to the Neumann conditions, the authors associate a
system of ordinary differential equations (ode's) from
which the dynamics of the original system can be inferred.
Small perturbations of the Neumann case produce large
perturbations in the ode's with corresponding effects on
the dynamics of the system. The same theory is valid for
functional differential equations. Applications are
considered in models for control by genetic repression of
biological material in cells. (Author)

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS,
BIOLOGY, BOUNDARIES, DIFFERENTIAL EQUATIONS, DIFFUSIVITY,
DOMAIN WALLS, DYNAMICS, HOMOGENEITY, PARABOLAS,
PERTURBATIONS

IDENTIFIERS: (U) PEG1102F, WUAFOSR23044A1

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DTIC REPORT BIBLIOGRAPHY

AD-A158 641 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Notes on Layer Stripping Solutions of Higher Dimensional Inverse Seismic Problems,

DEC 83 18P

PERSONAL AUTHORS: Yagle, A. E.;

REPORT NO. LIDS-P-1347

CONTRACT NO. AFOSR-82-0135

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The subject of this paper is the inverse seismic problem in dimensions higher than one, in which local density and wave speed are function of more than one spatial variable. To clarify matters, some terminology is introduced. The dimension of an inverse problem is defined as the number of spatial variables on which the quantities of interest (rho and c) depend. Thus, the two-dimensional problem is the inverse problem of determining rho(x,z) and c(x,z) from surface measurements of the displacement u(x, y, z=0, t), and the three-dimensional problem is the inverse problem of determining rho(x,y,z) and c(x,y,z) from surface measurements of the displacement u(x,y,z=0, t). Note that the dimension of a problem need not be the same as the dimension of the medium for which it is defined - a problem of given dimension of the medium for which it is defined - a problem of given dimension can be embedded in a medium of higher dimension. For example, the offset problem described in a previous work is a 1-D problem embedded in a 2-D medium, while the point-source problem of that same paper is a 1-D problem embedded in a 3-D medium. While a considerable amount of work has been done on the 1-D problem, much less has been done on the 2-D and 3-D problems.

AD-A158 641 CONTINUED

DESCRIPTIONS: (U) INVERSION, SEISMIC WAVES, DENSITY, MEASUREMENT, SIZES, DIMENSIONS, SPATIAL DISTRIBUTION, SURFACES, TWO DIMENSIONAL, VARIABLES, VELOCITY, WAVES, PROBLEM SOLVING

IDENTIFIERS: (U) PE81102F, WUAF052304A1
UNCLASSIFIED
DTIC REPORT BIBLIOGRAPHY
AD-A158 631 5/10
MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL
INTELLIGENCE LAB
(U) Computations Underlying the Measurement of Visual
Motion.
84 47P
PERSONAL AUTHORS: Hildreth, E. C.;
CONTRACT NO. F49620-83-C-0135
PROJECT NO. 2313
TASK NO. A5
MONITOR: AFOSR
TR-85-0585
UNCLASSIFIED REPORT
SUPPLEMENTARY NOTE: Pub. in Artificial Intelligence, v23
ABSTRACT: (U) This paper presents a method for computing
the velocity field, with three main components. First,
initial measurements of motion in the image take place at
the location of significant intensity changes, which give
rise to zero-crossings in the output of the convolution
of the image with a DEL square G operator. The initial
motion measurements provide the component of velocity in
the direction perpendicular to the local orientation of
the zero-crossing contours. Second, these initial
measurements are integrated along contours to compute the
two-dimensional velocity field. Third, an additional
constraint of smoothness of the velocity field, based on
the physical constraint that surfaces are generally
smooth, allows the computation of a unique velocity field.
The details of an algorithm are presented, with results
of the algorithm applied to artificial and natural image
sequences.
DESCRIPTORS: (U) MOTION, VISION, ORIENTATION(DIRECTION),
MEASUREMENT, COMPUTATIONS, IMAGES, EQUATIONS, THEORY,
ALGORITHMS, REPRINTS
IDENTIFIERS: (U) Visual motion, WAFAOSR2313A5, PEB1102F
AD-A158 631
UNCLASSIFIED
SEARCH CONTROL NO. EVK15N
AD-A158 621 7/4
CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY
(U) Synthesis, Structure and Reactivity of Molecules
Attached to Electrode Surfaces.
DESCRIPTIVE NOTE: Final rept. 15 Apr 81-15 Apr 85,
JUL 85 43P
PERSONAL AUTHORS: Hubbard, A. T.;
CONTRACT NO. AFOSR-81-0149
PROJECT NO. 2303
TASK NO. A1
MONITOR: AFOSR
TR-85-0627
UNCLASSIFIED REPORT
ABSTRACT: (U) This project was to determine the
structure, orientation, composition and reactivity of the
surface molecular species which form spontaneously when
metals come into contact with fluids, as in batteries,
fuel cells, electronic circuits, marine environments and
the atmosphere. These include: determination of the
spatial orientations and mode of attachment of typical
organic molecules chemically bonded to electrode surfaces;
discovery that each orientation of an adsorbed molecule
reacts differently; identification and exploration of
variables which influence adsorbate orientation
(concentration, temperature, potential, electrolyte,
solvent, substrate, surface structure, pH and hydrogen
bonding); exploration of the influence of oriented
adsorbates on electrode rates; preparation of well-
defined surfaces under atmospheric conditions;
electrodeposition of highly ordered layers of Ag and Cu
onto well-defined substrates; discovery of the
orderedness of adsorbed ionic layers at well-defined
surfaces; direct experimental exploration of the
cation-selectivity of metal-solution surfaces. These findings
were made possible by a unique combination of surface
research techniques in ultra-high vacuum and
electrochemistry in solution, employed in a long-term
systematic series of investigations.
AD-A158 621
UNCLASSIFIED PAGE 197 EVK15N
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AD-A158 621 CONTINUED

SEARCH CONTROL NO. EVK15N

AD-A158 620 21/2 21/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Combustion Behavior of Free Boron Slurry Droplets.
MAY 85 27P

PERSONAL AUTHORS: Takahashi,F.;Dryer,F. L.;Williams,F.

A.

REPORT NO. MAE-1702

CONTRACT NO. F49620-82-K-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0559

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper reports first observations of
the combustion properties of isolated boron/JP-10 slurry
droplets in high temperature, atmospheric pressure
oxidizing streams under low Reynolds number conditions.
Slurry droplets of initial diameter between 400 and 500
micrometers and initial solid mass fraction of 0.3 were
studied using single-lens reflex and high speed cine
photography under both self illuminated and backlit
conditions. Boron slurry droplets burned for short
periods of time with an envelope diffusion flame
structure, but then experienced violent disruption for
all cases studied. The intensity of the disruption
progress was found to be strongly influenced by the
temperature of the envelope diffusion flame. The ignition
of the boron particles emitted from the initial fuel
droplet was also affected by this flame temperature. As
this flame temperature was increased by increasing the
environmental oxygen content, the disruption occurred at
earlier times in the vapor phase burning period. Ignition
of the boron particles at high flame temperatures (>2500K)
was accompanied by a popping sound and a bright
greenish flash of luminosity.

DESCRIPTORS: (U) *BORON, *COMBUSTION, *JET ENGINE FUELS,
*SLURRY FUELS, BAROMETRIC PRESSURE, OXIDATION, STREAMS,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 620 CONTINUED

DROPS, SLURRIES, DIFFUSION, ENVELOPE(SPACE), FLAMES,
STRUCTURAL PROPERTIES, FLAMES, LUMINOUSITY, PARTICLES,
TEMPERATURE, FUELS, HIGH VELOCITY, IGNITION, INTENSITY,
OBSERVATION, SHORT RANGE(TIME), HIGH TEMPERATURE,
ILLUMINATION, LOW RATE, REYNOLDS NUMBER, PHOTOGRAPHY

IDENTIFIERS: (U) WUAFOSR2304A2, PEG1102F

SEARCH CONTROL NO. EVK15N

AD-A158 619 12/1

GEORGIA INST OF TECH ATLANTA

(U) Extreme Values of Queues, Point Processes and
Stochastic Networks.

DESCRIPTIVE NOTE: Research progress rept. 30 Sep 84-15
JUN 85,
JUN 85 5P

PERSONAL AUTHORS: Serfozo, R. F.;

CONTRACT NO. AFOSR-84-0387

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0820

UNCLASSIFIED REPORT

ABSTRACT: (U) This document reports on research progress
in the following topics: (1) Extreme Values of Queues -
Several subtle technical problems remain to present the
results in as general and natural setting as possible; (2)
Extreme Values of Stochastic Networks - Work should be
completed by fall. After that the emphasis will change on
this topic to the following one; (3) Optimal Control of
Networks of queues - This topic was not in the original
proposal, but the investigators have made a breakthrough
in this area that they intend to pursue; (4) Point
Processes Related to Extreme Values - Several results in
the convergence of certain point processes to Poisson
processes have been obtained. These are documented in two
papers written under this grant; and (5) Extreme Values
of Point Processes - This is an area which will be
developed later in the research effort. (Author)

DESCRIPTORS: (U) *QUEUEING THEORY, *STOCHASTIC PROCESSES,
CONTROL, NETWORKS, RANGE(EXTREMES), OPTIMIZATION, POISSON
DENSITY FUNCTIONS, VALUE, POINTS(MATHEMATICS),
RANGE(EXTREMES)

IDENTIFIERS: (U) Stochastic networks, WUAFOSR2304A5,
PEG1102F

AD-A158 619

UNCLASSIFIED PAGE 199 EVK15N
The computation of the velocity field.

84 35P

PERSONAL AUTHORS: Hildreth, E. C.

CONTRACT NO. F49620-83-C-0135

MONITOR: AFOSR TR-85-0587

The organization of movement in the changing retinal image provides a valuable source of information for analyzing the environment in terms of objects, their motion in space, and their three-dimensional structure. A description of this movement is not provided to our visual system directly, however; it must be inferred from the pattern of changing intensity that reaches the eye. This paper examines the problem of motion measurement, which we formulate as the computation of an instantaneous two-dimensional velocity field from the changing image. Initial measurements of motion take place at the location of significant intensity changes. These measurements provide only one component of local velocity, and must be integrated to compute the two-dimensional velocity field. A fundamental problem for this integration stage is that the velocity field is not determined uniquely from information available in the changing image. We formulate and additional constraint of smoothness of the velocity field, based on the physical assumption that surfaces are generally smooth, which allows the computation of a unique velocity field.

DESCRIPTORS: (U) *IMAGE PROCESSING, *VISUAL PERCEPTION, *SPACE PERCEPTION, VISION, TARGETS, MOTION, RETINA, VELOCITY, THREE DIMENSIONAL, TWO DIMENSIONAL, INFORMATION PROCESSING, COMPREHENSION, COMPUTATIONS, MATHEMATICAL MODELS, REPRINTS

IDENTIFIERS: (U) Motion analysis, WUAFOSR2313AS.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 811 5/10 6/18

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) On the Dependence of P300 Latency on Stimulus Evaluation Processes,

MAR 84 18P

PERSONAL AUTHORS: Magliero, A.; Bashore, T. R.; Coles, M. G. H.; Donchin, E.;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-85-0612

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Psychophysiology, v21 n2 p171-186 Mar 84.

ABSTRACT: (U) McCarthy and Donchin (1981) found that the latency of a late positive component of the event-related potential (ERP) was influenced by the presence of noise in a stimulus matrix but not by the compatibility between the stimulus presented and the response required. They concluded that this component is a P300 and that its latency was influenced by stimulus evaluation but not by response selection processes. The present experiments were designed to confirm that the component identified by McCarthy and Donchin was indeed a P300 and to determine if its latency varies systematically with increases in stimulus evaluation time produced by graded changes in noise level. In Experiment 1, subjects performed a standard oddball task in which they were required to count the rarer of two stimuli (the words RIGHT or LEFT) which were, or were not, embedded in a noise matrix (characters from the alphabet).

DESCRIPTORS: (U) *REACTION (PSYCHOLOGY), WORD RECOGNITION, CUES (STIMULI), PSYCHOPHYSIOLOGY, RESPONSE, SELECTION, REACTION TIME, NOISE, AMPLITUDE, VISUAL PERCEPTION, BRAIN, ELECTROENCEPHALOGRAPHY, VISUAL SIGNALS, PERFORMANCE (HUMAN), REPRINTS

UNCLASSIFIED
ABSTRACT: (U) A modified Rao-Rubbin condition for damage models gives rise to a recurrence relation which is somewhat different from that considered by Shanbhag (1977). A complete solution to the new recurrence relation is obtained and its applications are indicated. Additional keywords: Random variables; Integrated Cauchy functional equation. (Author)

Descriptors: (U) *CAUCHY PROBLEM, DAMAGE, RANDOM VARIABLES, EQUATIONS, FUNCTIONAL ANALYSIS, MATHEMATICAL MODELS, MODIFICATION, NUMERICAL INTEGRATION

Identifiers: (U) *Shanbhag's lemma, Rao Rubbin condition, PE611027, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 594 CONTINUED

IMAGE PROCESSING, NOISE, SPECTRA, FUNCTIONS, OPTIMIZATION,
SAMPLING, CHARGE COUPLED DEVICES, SOURCES, SIGNAL TO
NOISE RATIO, ELECTRODES, VOLTAGE, DETECTORS, IMAGE TUBES,
INTERFEROMETRY, WHITE NOISE, GALAXIES

IDENTIFIERS: (U) PEB1102F, WUAFSR2311A1

SEARCH CONTROL NO. EVK15N

AD-A158 591 11/6 20/11

CONNECTICUT UNIV STORRS DEPT OF METALLURGY


DESCRIPTIVE NOTE: Final scientific rept. 1 Dec 80-30 Nov
84.

MAR 85 61P

PERSONAL AUTHORS: McEvily, A. J.

CONTRACT NO. AFOSR-81-0046

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR

TR-85-0489

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the important conditions in
qualifying high strength powder metallurgy alloys is
their resistance to fatigue crack propagation. The
results of the present investigation indicate that the
fatigue crack propagation resistance of high strength P/M
aluminum alloys is equivalent to that of a comparable
ingot metallurgy alloy in the near-threshold region. The
ingot alloy exhibits a slightly lower crack growth rate
in the intermediate region. However the higher strength
of the P/M alloys (550 MPa YS, 600 MPa UTS) as compared
to the ingot alloy (450 MPa, 550 MPa) results in a
reduction of fracture toughness with the result that the
crack growth rates at high (Delta) K levels are higher in
the P/M alloys. If exactly equivalent tensile properties
were present in both P/M and I/M materials perhaps this
difference would not occur since nothing characterizable
as a defect was found in the P/M alloys. A procedure for
the analysis of the growth of short cracks from notches
based upon crack closure considerations has also been
formulated. Short crack behavior is important in
establishing inspection intervals in retirement for cause
applications, for example. The rate and extent at which
crack closure develops in the wake of a newly formed
crack can be used not only in the treatment of short
crack behavior, but also to account for the notch size
effect in fatigue as well as for fatigue notch
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 591 CONTINUED

SENSITIVITY.

DESCRIPTIONS: (U) CRACK PROPAGATION, POWDER ALLOYS,
CRACKS, FATIGUE(MECHANICS), INSPECTION,
FRACTURE(MECHANICS), TOUGHNESS, TENSILE PROPERTIES, NOTCH
SENSITIVITY, OVERLOAD, ALUMINUM, ALLOYS

IDENTIFIERS: (U) Fatigue crack propagation, Short Cracks,
Crack Closure, PE81102F, WJAFOSR2306A1

SEARCH CONTROL NO. EVK15N

AD-A158 590 9/2

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
COMPUTER SCIENCE

(U) Programming Productivity Enhancement by the use of
Application Generators by the use of Application
Generators.

DESCRIPTIVE NOTE: Research progress rept. 10 Jan-31 May
85,
JUN 85 15P

PERSONAL AUTHORS: Horowitz, E.

CONTRACT NO. AFOSR-82-0232

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0618

UNCLASSIFIED REPORT

ABSTRACT: (U) The first chapter deals with the specific
research areas that were investigated and discuss the
accomplishments for each. The areas of research are:
Application Generators; Office Information Systems;
Software Engineering; and the Script Writer Software
Development Environment. The next chapter reviews the
progress of all people who have been supported under the
grant. Additional keywords: Add programming language; and
Computer applications. (Author)

DESCRIPTORS: (U) COMPUTER PROGRAMMING, PROGRAMMING
LANGUAGES, COMPUTER APPLICATIONS, COMPUTER PROGRAMS,
GENERATORS, INFORMATION SYSTEMS, PRODUCTIVITY, SYSTEMS
ENGINEERING, COMPUTER PROGRAMS, GENERATORS, INFORMATION SYSTEMS,
PRODUCTIVITY, PROGRAMMING LANGUAGES, SYSTEMS ENGINEERING

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A2

UNCLASSIFIED

PAGE 204 EVK15N
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 589 12/1 14/4

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Mean Residual Life: Theory and Applications.

DESCRIPTIVE NOTE: Interim rept.,

JUN 85 2IP

PERSONAL AUTHORS: Guess, F.; Proschan, F.;

REPORT NO. FSU-STATISTICS-M702

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, AFOSR
TR-85-0630, TR-85-178

UNCLASSIFIED REPORT

ABSTRACT: (U) In the last two decades, reliability engineers, statisticians, and others have shown intensified interest in the mean residual life (MRL) and derived many useful results concerning it. Given that a unit is at age t, the remaining life after time t is random. The expected value of this random residual life is called the mean residual life at time t. Since the MRL is defined for each time t, we also speak of the MRL function. The MRL function is like the density function the moment generating function, or the characteristic function: for a distribution with a finite mean, the MRL completely determines the distribution via an inversion formula. Not only is the MRL used for parametric modeling but also for nonparametric modeling. Large non-parametric classes of life distributions such as decreasing mean residual life (DMRL) and new better than used in expectation (NBUE) have been defined using MRL. This paper defines the MRL function formally and survey some of the key theory. Its wide range of applications is also discussed. Additional keywords: Reliability, Failure rate. (Author)

DESCRIPTORS: (U) *LIFE EXPECTANCY (SERVICE LIFE), FORMULAS (MATHEMATICS), DISTRIBUTION FUNCTIONS, RESIDUALS, NORMAL DENSITY FUNCTIONS, FORMULATIONS, INVERSION, FUNCTIONS, MOMENTS, RELIABILITY, FAILURE, RATES, MODELS,
ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) Twas Ten to One; And Yet We Ventured: P300 and Decision Making.

83 13P

PERSONAL AUTHORS: Karlis, D.; Chesney, G. L.; Donchin, E.;

CONTRACT NO. N00014-78-C-0002, F48620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR

TR-85-0590


ABSTRACT: (U) In some situations subjects' predictions of future events do not accurately reflect the subjective probability associated with these events. We set up a situation by manipulating the payoff structure in a prediction paradigm, and found that P300 provides an index of the processes responsible for subjective probability, or expectancy, not obtainable from overt predictions. Sixteen subjects were required to predict, on each trial, whether a 1, 2 or 3 would appear on a display. The numbers appeared randomly with probabilities .45, .10, and .45, respectively. In one condition subjects were given bonuses according to an all-or-none payoff function in which they received one cent if they predicted correctly, and nothing if they were incorrect. In a second condition bonuses were determined by a linear payoff function in which subjects were paid one cent if they predicted correctly, and one-half cent if they were off by one (e.g. predict 1 and 2 appears). After each condition subjects estimated the actual number of stimuli presented. These estimates were the same for both conditions, although predictions differed radically, with 2 predicted much more frequently in the linear condition. P300 area was largest for the rare event (2), and the relationship between P300 and probability was unaffected by payoffs. Our design did not introduce between
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 580 9/3

MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL INTELLIGENCE LAB

(U) Fingerprints Theorems.
AUG 84 5P

PERSONAL AUTHORS: Yuille, A. L.; Poggio, T.

CONTRACT NO. N00014-80-C-0505, F49820-83-C-0135

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0589

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the National Conference on Artificial Intelligence, p362-365, 6-10 Aug 84.

ABSTRACT: (U) In this reprint the authors prove that the scale map of the zero-crossings of almost all signals filtered by a gaussian of variable size determines the signal uniquely up to a constant scaling. Exceptions are signals that are antisymmetric about all their zeros (for instance infinitely periodic gratings). Their proof provides a method for reconstructing almost all signals from knowledge of how the zero-crossing contours of the signal filtered by a gaussian filter, change with the size of the filter. The proof assumes that the filtered signal can be represented as a polynomial of finite, albeit possibly very high, order. The result applies to zero- and level-crossings of signals filtered by gaussian filters. The theorem is extended to two dimensions, that is to images. These results imply that extrema (for instance of derivatives) at different scales are a complete representation of a signal. Additional keywords: image understanding; edge detection. (Author)

DESCRIPTORS: (U) *SIGNAL PROCESSING, SIGNALS, DETECTION, EDGES, FINGERPRINTS, THEOREMS, POLYNOMIALS, CONSTANTS, SCALING FACTORS, FILTERS, SIGNALS, GRATINGS(SPECTRA), REPRINTS

AD-A158 580

UNCLASSIFIED

PAGE 207 EVK15N
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Further Informational Properties of the Nash and Stackelberg Solutions of LQG Games.

DESCRIPTIVE NOTE: Final rept. Jun 82-May 84.

MAY 85 91P

PERSONAL AUTHORS: Papavassilopoulos, G. P.

REPORT NO. 53-4503-1797

CONTRACT NO. AFOSR-82-0174

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0624

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers a two-decision-maker problem where each decision maker has his own information and studies the impact of improving the information of only one decision maker. In a previous document an example of a two-decision-maker LQG static Nash game was considered and was shown for that particular example that, on the one hand, if one of the decision makers improves his own information by obtaining his opponent's information (while his opponent's information does not change) then he ends up with a higher Nash cost; on the other hand, if he improves his own information by getting an extra measurement not from his opponent (while his opponent's information does not change) then he might incur lower Nash cost. This paper proves that in a general two-decision-maker LQG static or dynamic Nash game, if one of the decision makers knows all his opponent's information, then more or better information for him alone is beneficial to him. In static games the authors prove that more information for one of the decision maker's information is orthogonal to both decision maker's information. Additional keywords: Numerical analysis; Kalman filtering; Orthogonality; Matrices (Mathematics).
ABSTRACT: (U) A detailed parametric study of the ignition of a monodisperse fuel-air spray in contact with a hot wall was conducted. The theoretical model was one-dimensional unsteady and employed a hybrid Eulerian-Lagrangian numerical scheme. Effects of droplet size, chemical kinetics, fuel-air ratios, fuel type and other parameters were examined. The results indicated the statistical character of the spray ignition, the existence of optimum droplet size and optimum fuel-air ratio for the minimum ignition delays. The study was extended to the polydisperse spray. The major conclusion was that the polydisperse results can be correlated with an equivalent monodisperse spray represented by a mean diameter based on the total spray surface area. The study of ignition for sprays flowing over a hot plate as initiated. The formulation and the numerical coding were completed. Currently the code is being employed to predict the ignition delays for the flowing sprays. Preliminary experiments were conducted to investigate the ignition of a single droplet stream along a heated surface. The results show an optimal distance from the surface for the droplet stream. It is speculated that this distance depends on the characteristic evaporation time, diffusion time and convective time inherent to the...
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 559 21/2 20/1 21/9.2

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.

DESCRIPTIVE NOTE: Interim scientific rept.,

APR 85 19P

PERSONAL AUTHORS: Zinn, B. T.; Daniel, B. R.;

CONTRACT NO. AFOSR -84-0082

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR

TR-85-0561

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of this study is the determination of the fundamental mechanisms responsible for the driving of axial instabilities by solid propellant flames. During the report period, the behavior of a premixed flame stabilized on the side wall of a duct in the presence of an axial acoustic field was investigated both theoretically and experimentally. The developed model solutions show that driving occurs due to the combustion process heat addition while outside the reaction zone the waves are damped by viscous processes. This damping increases as the thickness of the acoustic boundary layer increases. Experimental facilities for studying oscillating duct flow in the presence and absence of flames were developed. Cold flow studies verified the presence of an excess velocity region within the acoustic boundary layer (i.e., the Richardson Effect) and the dependence of the boundary layer thickness upon the frequency and wall injection velocity. Reactive flow studies showed that the behavior of the flame depends upon its location relative to the standing acoustic wave. When the flame was positioned next to a velocity antinode, unexpected instabilities appeared on its surface eventually resulting in severe flame distortion. Also, the measured C-C and C-H radiation signals were periodic and they oscillated with the same frequency as the acoustic wave. Keywords: Flame-Acoustic interactions; and Flame driving.

DESCRIPTORS: (U) *ACOUSTIC WAVES, *BEHAVIOR, *FLAMES, *COMBUSTION STABILITY, *SOLID ROCKET PROPELLANTS, ACOUSTIC FIELDS, ACOUSTIC WAVES, ACOUSTICS, ADDITION, AXES, BOUNDARY LAYER, COLD FLOW, COMBUSTION, DAMPING, DISTORTION, FLOW, HEAT, HIGH RATE, INJECTION, INTENSITY, MIXING, MODELS, REACTION KINETICS, SIDES, SOLID PROPELLANTS, SOLUTIONS(GENERAL), STANDING WAVES, THICKNESS, VELOCITY, VISCOSITY, WALLS, OSCILLATION

IDENTIFIERS: (U) Flame driving, Flame acoustic interactions, Solid rocket instabilities, Richardson effect, WUAFOSR2308A1, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 555 12/1
GEORGIA INST OF TECH ATLANTA SCHOOL OF INDUSTRIAL AND SYSTEMS ENGINEERING
(U) Compound Poisson Approximations for Sums of Random Variables.
MAY 85 17P
PERSONAL AUTHORS: Sarfozo, R. F.;
CONTRACT NO. AFOSR-84-0387
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR TR-85-0623

UNCLASSIFIED REPORT

ABSTRACT: (U) This document shows that a sum of dependent random variables is approximately compound Poisson when the variables are rarely nonzero and, given they are nonzero, their conditional distributions are nearly identical. It gives several upper bounds on the total-variation distance between the distribution of such a sum and a compound Poisson distribution. Included is an example for Markovian occurrences of a rare event. The bounds are consistent with those that are known for Poisson approximations for sums of uniformly small random variables. (Author)

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), *RANDOM VARIABLES, MARKOV PROCESSES, DISTRIBUTION FUNCTIONS

IDENTIFIERS: (U) *Poisson approximation, WUAFOSR23044A5, PE81102F

UNCLASSIFIED REPORT

AD-A158 555 20/5
CORNELL UNIV ITHACA NY BAKER LAB
(U) Studies of Energy Storage and Transfer in Gas Lasers.
DESCRIPTIVE NOTE: Final technical rept. 1 Mar 82-28 Feb 85.
APR 85 12P
PERSONAL AUTHORS: Wiesenfeld, J.;
CONTRACT NO. AFOSR-82-0037
PROJECT NO. 2303
TASK NO. B1
MONITOR: AFOSR TR-85-0504

ABSTRACT: (U) This experimental program was designed to elucidate the behavior of electronically excited atoms and molecules in gases and examine methods by which these species might generally be detected using laser-based spectroscopic techniques. To that end, several atomic and molecular states were observed using Resonance Multiphoton Ionization. In addition the photodissociative production of electronically excited states was investigated and the subsequent deactivation of excited atoms in collisional encounters with molecules studied.
Keywords include: Lasers, Photochemistry, Energy Transfer, Iodine, Kinetics, Potassium, Electronic excitation, and Mercury bromide.

DESCRIPTORS: (U) *PHOTOCHEMICAL REACTIONS, *GAS LASERS, *PHOTODISSOCIATION, *ENERGY STORAGE, ATOMIC ENERGY LEVELS, ATOMS, BROMIDES. DEACTIVATION, ELECTRONS, ENERGY TRANSFER, EXCITATION, GASES, IODINE, IONIZATION, LASERS, MERCURY, MOLECULAR STATES, MOLECULES, PHOTONS, POTASSIUM, PRODUCTION

IDENTIFIERS: (U) WUAFOSR230381, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 542 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Identifiability under Approximation for an Elliptic Boundary Value Problem.

DESCRIPTIVE NOTE:  Interim rept.,

APR 85 41P

PERSONAL AUTHORS:  Kunisch, K.; White, L. W.

REPORT NO.  LCDS-85-13

CONTRACT NO.  AFOSR-84-0388

PROJECT NO.  2304

TASK NO.  A1

MONITOR:  AFOSR TR-85-0554

UNCLASSIFIED REPORT

ABSTRACT:  (U) Necessary and sufficient conditions for identifiability of the diffusion coefficient in Galerkin approximations to a two point boundary value problem are derived for various choices of Galerkin subspaces. The results are further used to investigate output least squares identifiability and output least squares stability of the diffusion coefficient. Additional keywords: Numerical analysis; Matrices(Mathematics).

(\textit{Author})

DESCRIPTORS:  (U) \*APPROXIMATION(MATHEMATICS), \*BOUNDARY VALUE PROBLEMS, DIFFUSION COEFFICIENT, ELLIPSES, LEAST SQUARES METHOD, NUMERICAL ANALYSIS, OUTPUT, STABILITY, MATRICES(MATHEMATICS)

IDENTIFIERS:  (U) Galerkin method, PE81102F, WUAFO8R2304A3

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A158 538 12/1

PITTSBURGH UNIV PA

(U) The Dual Variable Method for Finite Element Discretizations of Navier-Stokes Equations, 85 15P

PERSONAL AUTHORS:  Hall, C. A.; Peterson, J. S.; Porsching, T. A.; Sledge, F. R.;

CONTRACT NO.  AFOSR-80-0176, AFOSR-84-0131

PROJECT NO.  2304

TASK NO.  A3

MONITOR:  AFOSR TR-85-0633

UNCLASSIFIED REPORT


ABSTRACT:  (U) The numerical solution of two-dimensional, transient, incompressible Naiver-Stokes problems is considered in this reprint. (Author)

DESCRIPTORS:  (U) \*NAVI R STOKES EQUATIONS, \*NUMERICAL ANALYSIS, VARIABLES, FINITE ELEMENT ANALYSIS, TWO DIMENSIONAL, PROBLEM SOLVING, INCOMPRESSIBILITY, TRANSIENTS, REPRINTS

IDENTIFIERS:  (U) PE61102F, WUAFO8R2304A3

AD-A158 538

UNCLASSIFIED PAGE 212 EVK15N
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DTIC REPORT BIBLIOGRAPHY

AD-A158 534 7/3
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
(U) Distibines, New One-Dimensional Materials.

ABSTRACT: (U) A large number of novel diarsines, distibines and dibismuthines have been prepared. It has been shown that thermochromic distibines and presumably the corresponding dibismuthines show a solid-phase association which is responsible for the intense color of their solid state. Distibines react with a variety of reagents. The products invariably involve cleavage of the metal-metal bond. A new general synthesis of C-unsubstituted heteroles has been developed. (Author)

DESCRIPTORS: (U) METAL METAL BONDS, HETEROCYCLIC COMPOUNDS, DIATOMIC MOLECULES, CLEAVAGE, COLORS, INTENSITY, SOLID PHASES, SYNTHESIS (CHEMISTRY), THERMIONIC EMISSION, MOLECULAR STRUCTURE

IDENTIFIERS: (U) Stibines, Distibines, Diarsines, Dibismuthines, Heteroles, Thermochromic properties, PE81102F, WUAFOSR230382

UNCLASSIFIED REPORT

AD-A158 533 20/6
WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA
(U) Program to Develop an Optical Transistor and Switch.

ABSTRACT: (U) Previous work has proposed and analyzed the concept of two light beams interacting with a suitable medium to the effect that one beam turns the second beam on or off (an optical switch), or that the modulation in the first beam is amplified in the second (an optical transistor). Switching action was also demonstrated experimentally in uranyl for switching rates up to several kHz. In the present work, a more general survey and analysis was undertaken to identify classes and species of materials for which a particularly effective switching or transistor action can be predicted theoretically. As a class, dense materials, including liquid dyes, have broad absorption band spectra, resulting in low-performance capabilities such as a low transistor gain. In contrast, media in which atomic transitions are free, or shielded, from the fields of other atoms have, as switches and transistors, relatively high speeds of response and low demands on radiation power and mass of interacting materials. As special examples of this class, the performance characteristics of lithium and sodium were calculated and the implications of the results discussed with respect to further action. Keywords include: Optical, Switch, Transistors, Absorption, Relaxation, Rate, Cross sections, Lithium, Sodium, Transition, Line and Bands.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N
AD-A158 529 7/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

U) Structure Calculations for Silane Polymers: Polysilane
and Poly(dimethylsilylene).
85 7P

PERSONAL AUTHORS: Damewood, J. R., Jr.; West, R.

CONTRACT NO. F48620-83-C-0044, AFOSR-82-0087

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0574

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v18 n2 p159-
164 1985.

ABSTRACT: (U) The structure and conformational energies
of polysilane, H-(SiH2)n-H, and poly(dimethylsilylene),
Me-(SiMe2)n-Me, have been investigated by using full
relaxation empirical force field (EFF) techniques. Gauche
conformational states are calculated to be lowest in
energy for both polymers. These results contrast with
polyethylene hydrocarbon polymers which typically adopt
trans conformation in the ground state. Both polysilane
and poly(dimethylsilylene) are calculated to be
conformationally more flexible than polyethylene.

DESCRIPTORS: (U) *POLYSILANES, *MOLECULAR STRUCTURE,
MOLECULAR ENERGY LEVELS, RELAXATION, ELECTRONIC STATES,
REPRINTS

IDENTIFIERS: (U) Silylene/polydimethyl, PE61102F,
WUAFOSR2230382

UNCLASSIFIED
nematogens here considered, which are of comparatively low chain length, leads to rapid generation of ordered domains of large dimensions. Subsequent diffusional transport over the required distances consequently is very slow. The transition temperatures observed in binary systems are in excellent agreement with calculations carried out in the single component approximation using mean values of the axial ratio and of T* for the mixture.

DESCRIPTORS: (U) +LIQUID CRYSTALS, +POLYMERS, +BENZOATES, +PHASE TRANSFORMATIONS, THERMODYNAMICS, TRANSITION TEMPERATURE, CRYSTAL STRUCTURE, STATISTICAL MECHANICS, REPRINTS

IDENTIFIERS: (U) Benzoate/p-oxyl. PE61102F, WUAFOSR2303A3
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 512 5/10 6/18

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) Event-Related Brain Potentials in the Study of Consciousness,
83 43P

PERSONAL AUTHOR(S): Donchin, E.; McCarthy, G.; Kutas, M.; Ritter, W.;

CONTRACT NO. F49620-79-C-0233

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR

TR-85-0582

UNCLASSIFIED REPORT


ABSTRACT: (U) In this chapter, we review studies of event-related brain potentials (ERPs) that address, either explicitly or implicitly the phenomena of consciousness. An analysis of the methodology and findings of these studies leads to an examination of their conceptual foundations. It is our contention that these studies can benefit from recognizing the fundamental difference between the data on consciousness and the data on brain potentials. The data on consciousness take the form of introspective reports. That is, subjects report, either in words or by the manipulation of mechanical devices, about their consciousness. They may press a button labeled red, or state 'the red light was on', or report the number of times the red light was illuminated over a period of time. The data provided by the subject is the product of multiple brain processes, conscious and nonconscious. Electrical brain activities recorded on the scalp are, on the other hand, data on one or more of the processes that may be involved in conscious experience. We shall endeavor to show how this distinction between processes and their products, if used to guide research in cognitive psychophysiology, might lead to a firmer foundation for the development of a psychobiology of consciousness.

AD-A158 512 6/18

CONTINUED

DESCRIPERS: (U) CONSCIOUSNESS, ELECTROENCEPHALOGRAPHY, BRAIN, INFORMATION PROCESSING, PSYCHOPHYSIOLOGY, COGNITION, MEASUREMENT, REPRINTS

IDENTIFIERS: (U) ERP(Event Related Potentials), P300, MAFOSR2313A4, PEB1102F

AD-A158 512
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 511 11/9 11/10 20/11
CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Impact Resistance of Unfilled and Filled Bimodal Thermosets of Poly(Dimethylsiloxane).
84 4P

PERSONAL AUTHORS: Tang, M. Y.; Letton, A.; Mark, J. E.

CONTRACT NO. AFOSR-83-0027, NSF-DMR79-18903

PROJECT NO. A3

AD-A158 510 7/3

ROCKWELL INTERNATIONAL CANOGA PARK CA ROCKETDYNE DIV

(U) Bis-Pentafluorotelluriumoxide Fluorocarbons.

85 9P

PERSONAL AUTHORS: Schack, C. J.; Christe, K. O.

CONTRACT NO. F49620-81-C-0020

PROJECT NO. B2

UNCLASSIFIED REPORT


ABSTRACT: (U) Incorporating very short (non-elastomeric) chains in an elastomeric network, thereby giving a bimodal distribution of chain lengths, is known to have a significant toughening effect. In such networks, the short chains are thought to increase the ultimate strength because of their limited extensibility, and the long chains to retard the spread of rupture nuclei. The present investigation considers the related possibility of incorporating very long (elastomeric) chains in a relatively brittle thermoset in an attempt to improve its impact resistance. Bimodal networks of poly(dimethylsiloxane) (PDMS) are employed, both in the unfilled state and after filling by the in-situ precipitation of reinforcing silica particles.

DESCRIPTORS: (U) THERMOSETTING PLASTICS, SILOXANES, IMPACT STRENGTH, POLYMERS, METHYL RADICALS, ELASTOMERS, RUPTURE, REPRINTS

IDENTIFIERS: (U) Bimodal networks, Siloxane/polydimethyl, WUAFOSR2303A3, PE81102F

AD-A158 511

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A158 510

UNCLASSIFIED


ABSTRACT: (U) The reaction of xenon bis-pentafluorotelluriumoxide, Xe(OTeF5)2, with the halocarbons results in the high yield addition of two Tef50-groups to the double bond. These compounds are the first examples of Rf(OTeF5)2 compounds in which Rf is not perfluorinated. For perfluorobutadiene, saturation of both double bonds occurs readily to give 1, 2,3,4(Tef50)4C4F6 in 97% yield.

DESCRIPTORS: (U) FLUORINATED HYDROCARBONS, TELLURIUM COMPOUNDS, OXIDES, SYNTHESIS(CHEMISTRY), XENON, CHEMICAL BONDS, SATURATION, REPRINTS

IDENTIFIERS: (U) Oxide/Xenon bis-Pentafluorotellurium, WUAFOSR2303A3, PE81102F

AD-A158 510
A Phenomenological Approach to the Calculation of the Diffusion Coefficient for Si on Si(111) Using Classical Trajectories,

A general method to calculate a lower bound and an estimated upper bound for the surface diffusion coefficient from jump frequencies of an adatom from one absorption site to another has been formulated. This method has been applied to the surface diffusion of Si on Si(111). Keating's potential has been used for the Si(111) lattice. The interaction potential between the adatom and the lattice is a pairwise sum of 80 Morse potentials involving the Si atoms in the first and second layers of the crystal. This potential formulation predicts the existence of two different types of adsorption sites on the Si(111) surface. The jump frequencies from these adsorption sites have been calculated by classical trajectory methods. Using these jump frequencies, a lower bound for the diffusion coefficient is calculated by solving a set of coupled phenomenological kinetic equations describing the jumping of adatoms between adjacent adsorption sites. The results at 800, 1000, 1200, and 1500 K yield a lower bound for the diffusion coefficient of $D > (8.53 + 0.11) \times 10^{-9}$ cm$^2$/s. At 1500 K, the computed mean-square displacement and velocity autocorrelation function give diffusion coefficients of 0.0711 and 0.0899 cm$^2$/s, respectively, which is in excess of the calculated lower bound at 1500 K by about a factor of 2. This suggests that diffusion of Si on Si(111) involves highly correlated motion. An estimate for the upper bound for the diffusion coefficient is obtained by removing from the set of coupled kinetic equations all terms involving adatom motion which leads back toward the original adsorption site.
(U) A Study of BIB Designs through Support Matrices, 85 12P
PERSONAL AUTHORS: Hedayat,A. ;Pesotan,H. ;
CONTRACT NO. AFOSR-80-0170
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR TR-85-0815


ABSTRACT: (U) This reprint deals with the existence and nonexistence of balanced incomplete block designs with repeated blocks. The approach is an algebraic one. The concept of a support matrix is introduced and some of its basic properties are noted. Some basic examples of support matrices are given when the block size is 3. The connection between full column rank proper support matrices and irreducible designs is explored and some examples of such matrices are given. (Author)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, *MATRICES*(MATHEMATICS), SIZES*(DIMENSIONS), REPRINTS

IDENTIFIERS: (U) BIB(Balanced Incomplete Blocks), WUAFOSR2304A5, PE81102F

AD-A158 491 11/10
CINCINNATI UNIV OH DEPT OF CHEMISTRY
CONTRACT NO. AFOSR-83-0027
PROJECT NO. 2303
TASK NO. A3
MONITOR: AFOSR TR-85-0516


ABSTRACT: (U) If the tetraethylorthosilicate (TEOS) used to end link hydroxyl-terminated poly(dimethylsiloxane) (PDMS) chains is present in excess, there are two effects on the resulting network structure. First, some of excess TEOS hydrolyzes to give in situ precipitation of reinforcing silica particles. In addition, some can cause extension of the polymer chains, particularly of the shorter chains in the case of a bimodal network. In the present investigation, the ultimate strength and toughness of such bimodal networks was found to go through a maximum with increase in the amount of excess TEOS used in the curing-filling procedure. (Author)

DESCRIPTORS: (U) *ELASTOMERS, CURING, FILLING, SILICONES, SILICATES, ETHYL RADICALS, REINFORCING MATERIALS, SILICON DIOXIDE, REPRINTS

IDENTIFIERS: (U) Silicate/Tetraethylortho, WUAFOSR2303A3, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 474 11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Simultaneous Curing and Filling of Elastomers.

84 5P


CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR

TR-85-0514

UNCLASSIFIED REPORT


ABSTRACT: (U) A method previously developed for the precipitation of reinforcing silica filler within an already cured elastomer is extended so as to permit simultaneous curing and filling. Specifically, tetraethyl orthosilicate is used to end-link hydroxyl-terminated chains of poly(dimethylsiloxane), with the excess present being hydrolyzed to finely divided SiO2. Increase in the amount of filler thus formed decreases the elongation required for the desired upturns in modulus and increases the maximum extensibility, ultimate strength, and energy required for rupture of the network.

DESCRIPTORS: (U) ELASTOMERS, CURING, FILLING, REINFORCING MATERIALS, SILICATES, FILLERS, HYDROLYSIS, SILICON DIOXIDE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVK15N

AD-A158 473 20/12 20/5

MATERIALS RESEARCH SOCIETY UNIVERSITY PARK PA

(U) Laser Chemical Processing of Semiconductor Devices.

DESCRIPTION NOTE: Final rept. 15 Nov 84-15 Nov 85.

NOV 84 135P

PERSONAL AUTHORS: Houle, F. A.; Deutsch, T. F.; Osgood, R. M., Jr.;

CONTRACT NO. AFOSR-85-0004

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR

TR-85-0531

UNCLASSIFIED REPORT


ABSTRACT: (U) Contents (Sections): Fundamental Mechanisms and Overall Review; Laser-Assisted Growth of Semiconductor Films; Process Diagnostics; Metallization from Thin Films and Gases; Fundamental Processes; Photochemical Etching; Dielectric Photoformation.

DESCRIPTORS: (U) SEMICONDUCTOR DEVICES, LASER APPLICATIONS, FABRICATION, MANUFACTURING, CHEMICAL ENGINEERING, LASER BEAMS, PHOTOCHEMICAL REACTIONS, SEMICONDUCTING FILMS, GROWTH(GENERAL), METALLIZING, THIN FILMS, GASES, ETCHING, DIELECTRICS, SYMPOSIA, ABSTRACTS, REPRINTS

IDENTIFIERS: (U) Dielectric photoformation, PE61102F, WUAFOSR2306B2

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PAGE 220 EVK15N
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 464 11/8

RENSSELAER POLYTECHNIC INST TROY NY

(U) US/Japan Seminar on Superalloys Held at Susono, Japan on 7-11 December 1984.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-1 Mar 85,
DEC 84 44P

PERSONAL AUTHORS: Stoloff, N. S.;

CONTRACT NO. AFOSR-84-0282

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-85-0348

UNCLASSIFIED REPORT

ABSTRACT: (U) The US/Japan Seminar on Superalloys was held on December 7-11, 1984. The scope of Japanese work on superalloys is comprehensive, with papers presented on the following subjects: alloy development, processing, mechanical properties, surface stability (oxidation and hot corrosion), phase stability and alternative materials (especially intermetallic compounds). These subjects represent a marked expansion of Japanese efforts on superalloys since the previous meeting in 1972.

DESCRIPTORS: (U) *SUPERALLOYS, FOREIGN TECHNOLOGY, JAPAN, PROCESSING, MECHANICAL PROPERTIES, OXIDATION, CORROSION, STABILITY, PHASE, SURFACE PROPERTIES, JET ENGINES

IDENTIFIERS: (U) PE61102F, WUAFO8R2306A1

SEARCH CONTROL NO. EVK15N

AD-A158 462 20/8

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Negative-Ion Formation from Surface Scattering at Finite Temperatures,
JAN 85 7P

PERSONAL AUTHORS: Liu, K. C.; George, T. F.; Lam, K. S.

REPORT NO. 54

CONTRACT NO. AFOSR-82-0046, NSF-CHE83-20185

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0517

UNCLASSIFIED REPORT


ABSTRACT: (U) Temperature effects on negative-ion formation in positive-ion-surface scattering are studied within the framework of the time-dependent Anderson-Newton model. It is shown that the negative-ion formation is significantly enhanced at finite temperature T, provided K subscript B T is not less than the Anderson correlation energy U, where K subscript B is the Boltzmann constant. In the transient region (femtosecond timescale), temperature effects are, however, masked by large energy fluctuations. (Author)

DESCRIPTORS: (U) *IONIZATION, ANIONS, CATIONS, SCATTERING, SURFACES, TEMPERATURE, MODELS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFO8R2303A2
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

IDAMO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Reactions of Polyfluoroalkyl Fluorosulfates with Nucleophiles: An Unusual Substitution at the Sulfur-Fluorine Bond.

DESCRIPTIVE NOTE: Rept. for Sep 82-Apr 85.

PERSONAL AUTHORS: Kinkead, S. A.; Kumar, R. C.; Shreeve, J. M.

CONTRACT NO. AFOSR-82-0247, NSF-CHE81-00158

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-85-0509

UNCLASSIFIED REPORT


ABSTRACT: (U) Polyfluoroalkyl fluorosulfates RfOSO2F(RF-CF3)2 double bond and (CF3)2CH react with amines and alcohols or alkoxides to yield new polyfluoroalkyl sulfamates and dialkyl sulfate esters, respectively. Unlike both perfluoroalkyl fluorosulfates and alkyl fluorosulfates, the sulfur-oxygen bond in these polyfluoroalkyl fluorosulfates remains intact in the presence of hard nucleophiles. With methanol, however, nucleophilic attack occurs primarily at the alpha-carbon of CF3CH2OSO2F to give methyl 2,2,2-trifluoroethyl sulfide. (Author)

DESCRIPTORS: (U) +SUBSTITUTION REACTIONS, +SULFUR COMPOUNDS, +FLUORINE COMPOUNDS, NUCLEOPHILIC REACTIONS, POLYMERS, ALKYL RADICALS, SULFANATES, ESTERS, SULFATES, SULFIDES, REPRINTS

IDENTIFIERS: (U) Nucleophiles, PEB1102F, WUAFOSR230382

SEARCH CONTROL NO. EVK15N

FLORIDA STATE UNIV TALLAHASSEE

(U) Nonparametric Concepts and Methods in Reliability.

84 45P

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

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0622

UNCLASSIFIED REPORT


ABSTRACT: (U) This reprint surveys the use of nonparametric methods in reliability theory. This survey is not complete, but focuses on classes of life distributions corresponding to various notions of aging. The authors have chosen this topic because a great deal of the nonparametric analysis in reliability is devoted to these classes of life distributions. Classes of life distributions based on notions of aging afford nonparametric statisticians an opportunity to consider problems of a character somewhat different from the usual. Instead of assuming that he knows nothing about the underlying life distribution, the statistician assumes that he does not know the parametric form of the life distribution, but that he does know, for example, that the failure rate is increasing. More generally, he knows that some type of aging property holds for the life distribution; this aging property gives rise to corresponding geometric property for the life distribution.

DESCRIPTORS: (U) +NONPARAMETRIC STATISTICS, +RELIABILITY THEORY, RATES, AGING(MATERIALS), GEOMETRY, LIFE EXPECTANCY(SERVICE LIFE), FAILURE, REPRINTS

IDENTIFIERS: (U) PEB1102F, WUAFOSR23045

AD-A158 461

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 449 7/3
ULTRASYSTEMS INC IRVINE CA

(U) Syntheses of Novel Nitrogen and Phosphorus Heterocycles.

DESCRIPTIVE NOTE: Final rept. 1 Mar 82-28 Feb 85,

APR 85 62P

REPORT NO. SN-2007-F
CONTRACT NO. F49620-82-C-0021
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR
TR-85-0500

UNCLASSIFIED REPORT

ABSTRACT: (U) 1-Dichlorophospha-3,5-perfluoro-n-heptyl (or perfluoroalkylether)-2,4,6-triazines were synthesized by interaction of imidoylamidines with phosphorus pentachloride. In a parallel approach, 1,3-bis(phenylchlorophospha)-5-perfluoroalkyl (or perfluoroalkylether)-2,4,6-triazines were obtained from the reaction of amidines with imido-diphenyl-diphosphinic acid pentachloride. Replacement of chlorine by thiophenyl and azido groups proceeded readily. Di-(phenylchlorophospha)-s-triazine was found to undergo further reaction with amidine in a 1:2 ratio. The existence of stereo-isomerism was indicated. The thiophenyl-substituted phospho-s-triazines functioned as corrosion and oxidation inhibitors in perfluoroalkylether fluids; however, their thermal and thermal oxidative stability was lower than that of the phenyl analogues. Both the mono- and diphaspha-s-triazines were completely degraded in 24 hr at 318 C in nitrogen; diphenylsulfide was one of the major products. Mass spectral analysis of the phenyl-free phospho-s-triazines revealed that the specific breakdown patterns are ring specific not phenyl-substituent dependent. Perfluoro-octanonitrile was found to react with aniline both in the absence and

presence of solvents. Treatment of perfluoro-octanonitrile with phenylphosphate gave tetraphenyldiphosphine and a spectrum of reduction and interaction products of perfluoro-octanonitriles, as well as phenylphosphate addition compounds.

DESCRIPTORS: (U) *SYNTHESIS (CHEMISTRY), *HETERO CYCLIC COMPOUNDS, *NITROGEN COMPOUNDS, *PHOSPHORUS COMPOUNDS, AMIDINES, APPROACH, AZIDES, CHLORIDES, CHLORINE, INHIBITORS, INTERACTIONS, NITROGEN, OXIDATION, PARALLEL ORIENTATION, PATTERNS, PHOSPHORUS, REPLACEMENT, SOLVENTS, SPECTRA, THERMAL STABILITY, MASS SPECTROSCOPY, TRIAZINES, CORROSION INHIBITION, REDUCTION (CHEMISTRY), PHOSPHINE

IDENTIFIERS: (U) WUAFOSR230382, PE61102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 427  7/3

IDAH0 UNIV  MOSCOW

(U) Synthesis and Structure Determination of 3,3,4,4-
Tetrafluoro-N-methyl-2-(cis,s-trans-methyl-NNO-azoxy)-
s-cis-1-cyclobutene-1-amine.

DESCRIPTIVE NOTE:  Rept. for 1 Sep 82-1 Sep 84,
85  3P

PERSONAL AUTHORS:  Hope,H. ;Shoemaker,C. B. ;Shoemaker,D.
P. ;Marsden,H. M. ;Shreeve,J. M. ;

CONTRAC T NO.  AFOSR-82-0247

PROJECT NO.  2303

TASK NO.  B2

MONITOR:  AFOSR
TR-85-0540

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:  Pub. in Jnl. of Organic Chemistry,
v50 n7 p1138-1137 1985.

ABSTRACT: (U) A highly substituted fluorinated azoxy
cyclobutene amine is formed when cyclobutene is reacted
with heptafluoronoitrosocyclobutane. This behavior has not
been described previously in the literature. When primary
amines and fluoroalkynitrosos are reacted, the usual
products are diazenes. (Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *AMINES,
MOLECULAR STRUCTURE, CYCLIC COMPOUNDS, BUTENES, FLUORINE,
METHYL RADICALS, REPRINTS

IDENTIFIERS: (U) Azoxy compounds, WUAFOSR230382.
PEB1102F

AD-A158 427

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A158 422  12/1

CALIFORNIA UNIV  LOS ANGELES DEPT OF ELECTRICAL
ENGINEERING

(U) Stability of an Exponentially Stabilizable System.
OCT 84  4P

PERSONAL AUTHORS:  Levan,N. ;

CONTRACT NO.  AFOSR-78-0053

PROJECT NO.  2304

TASK NO.  A6

MONITOR:  AFOSR
TR-85-0548

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:  Pub. in IEEE Transactions on
Automatic Control, vAC-29 n10 p939-941 Oct 84.

ABSTRACT: (U) This reprint discusses semigroup
generation regarding bounded linear operators on a
Hilbert space. Additional keywords; Steady state Riccati
equations.

DESCRIPTORS: (U) *OPERATORS(MATHEMATICS),
*GROUPS(MATHEMATICS), LINEARITY, STEADY STATE, HILBERT
SPACE, RICCATI EQUATION, STABILITY, REPRINTS

IDENTIFIERS: (U) *Semigroup(Mathematics), PEB1102F,
WUAFOSR230448

AD-A158 422
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 421 12/1

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL
ENGINEERING

(U) Strong Stability of Quasi-Affine Transforms of
Contraction Semigroups and the Steady-State Riccati
Equation.

MAR 85 11P

PERSONAL AUTHORS: Levan, N.

CONTRACT NO. AFOSR-79-0053

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR

TR-85-0545

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Optimization Theory
and Applications, v45 n3 p397-406 Mar 85.

ABSTRACT: (U) This reprint studies strong stability of
the class of strongly continuous Hilbert space semigroups
which are quasi-affine transforms of contraction
semigroups. Sufficient conditions for such a semigroup to
be approximately strong stable are given. Applications to
the stabilizability problem of Hilbert space semigroups,
using a feedback involving a solution of the steady-state
Riccati equation, are made. The key tool is the
generalization of the LaSalle invariance principle by
Hale.

DESCRIPTORS: (U) *GROUPS(MATHEMATICS),
+TRANSFORMATIONS(MATHEMATICS), STABILITY, RICCATI
EQUATION, STEADY STATE, HILBERT SPACE, REPRINTS

IDENTIFIERS: (U) *Semigroups(Mathematics), PE81102F,
WUAFO3R2304A8

AD-A158 420

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annali di Matematica pura ed

ABSTRACT: (U) This paper is concerned with the
development of an integration theory with respect to
operator-valued measures which is required in the study
of certain convex optimization problems. These convex
optimization problems in their turn are rigorous
formulations of detection theory. The integration theory
which is developed in this paper is used in conjunction
with convex analysis in Banach spaces to give necessary
and sufficient conditions of optimality for this class of
convex optimization problems. (Author)

DESCRIPTORS: (U) *OPERATORS(MATHEMATICS), *ESTIMATES,
+QUANTUM THEORY, OPTIMIZATION, THEORY, REPRINTS

IDENTIFIERS: (U) Integration theory, Convex optimization,
Banach spaces, Operator-valued measures, PE81102F,
WUAFO3R2304A1

AD-A158 420
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 419 11/8

HENRY KRUMB SCHOOL OF MINES NEW YORK

(U) Hot Isostatic Consolidation of P/M Superalloys.

DESCRIPTIVE NOTE: Interim rept., 84 p

PERSONAL AUTHOR(S): Kissinger, R. D.;Nair, S. V.;Tien, J. K.

CONTRACT NO. AFOSR-82-0352

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-85-0676

UNCLASSIFIED REPORT

ABSTRACT: (U) The kinetics of powder consolidation, or densification, and the powder morphological changes occurring during hot isostatic pressing (HIP) are studied as a function of particle size distribution and hold time at HIP temperature for the nickel base superalloy RENE-85. In order to understand the extent of individual powder particle deformation during consolidation and its effect on subsequent prior particle boundaries (PPB), particle size distribution was studied as a variable. Particle size distributions studied include monosized (75-90 micrometers), bimodal (75-90 micrometers and 33-35 micrometers) and commercial (104 micrometers) size distribution. The experimental results of HIP densification kinetics are compared with a newly developed analytical deformation mechanism model for HIP consolidation which takes into account the effect of a distribution of particle sizes on the kinetics of densification. (Author)

DESCRIPTORS: (U) *HOT PRESSING, *ISOSTATIC PRESSING, *NICKEL ALLOYS, *POWDER METALLURGY, BOUNDARIES, DEFORMATION, DISTRIBUTION, KINETICS, MATHEMATICAL MODELS, PARTICLE SIZE, PARTICLES, POWDERS, TEMPERATURE, TIME

IDENTIFIERS: (U) Superalloys, PE81102F, WUAFOSR2306A1

AD-A158 405

UNCLASSIFIED

SEARCH CONTROL NO. EVK15N

AD-A158 405 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Differential Methods in Inverse Scattering,

APR 85 27P

PERSONAL AUTHOR(S): Bruckstein, A. M.;Levy, B. C.;Kallath, T.

CONTRACT NO. AFOSR-82-0135, DAAG29-81-K-0057

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, ARO TR-85-0552, 18133. 100-EL

UNCLASSIFIED REPORT


ABSTRACT: (U) This reprint discusses a new set of differential methods for solving the inverse scattering problem associated to the propagation of waves in an inhomogeneous medium. By writing the medium equations in the form of a two-component system describing the interaction of rightward and leftward propagating waves, the causality of the propagation phenomena is exploited in order to identify the medium layer by layer. The recursive procedure that we obtain constitutes a continuous version of an algorithm first derived by Schur in order to test for the boundedness of functions analytic inside the unit circle. It recovers the local reflectivity function of the medium. Using similar ideas, some other differential methods can also be derived to reconstruct alternative parametrizations of the layered medium in terms of the local impedance or of the potential function. The differential inverse scattering methods turn out to be very efficient since, in some sense, they let the medium perform the inversion by itself and thus fully exploit its structure. They provide an alternative to classical methods based on integral equations, which, in order to exploit the structure of the problem, must ultimately resort to differential equations of the same type. (Author)
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVK15N

AD-A158 405 CONTINUED

AD-A158 397 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Base-Promoted Rearrangement of Cage Alpha-Halo Ketones,
3, 3,8-Dibromotetracyclo(6.3.0.0(4,11).0(5.9))undecane-2,7-dione,
85 3P

PERSONAL AUTHORS: Marchand, A. P.; Reddy, D. S.

CONTRACT NO. DAAK10-84-M-2001, AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-85-0472

UNCLASSIFIED REPORT


ABSTRACT: (U) Treatment of 3,8-dibromotetracyclo(6.3.0.0(4,11).0(5.9))undecane-2,7-dione (2) with solid sodium hydride in tetrahydrofuran at 25 C for 4 h afforded 7-
bromopentacyclo(5.4.0.0(2,6).0(3,10)(5.9))undecane-8,11-
dione (4). Treatment of 2 with solid sodium hydroxide in refluxing tetrahydrofuran for 4 h afforded instead pentacyclo(5.3.0.0(2,6).0(3,10)(5.9))decane-5-one-2-carboxylic acid (5). The intermediacy of 4 in the rearrangement of 2 to 5 was demonstrated. These rearrangements provide novel entries into the pentacyclo(5.4.0.0(2,6).0(3,10).0,9)undecyl and 1,3-
bishomocubyl ring systems, respectively from a common tetracyclic precursor (i.e., 2). (Author)

DESCRIPTORS: (U) *KETONES, *HALIDES, *MOLECULAR STRUCTURE, SYNTHESIS(CHEMISTRY), CYCLIC COMPOUNDS, BROMINE COMPOUNDS, DECANES, CARBOXYLIC ACIDS, REPRINTS

IDENTIFIERS: (U) Cubanes, Diones, WUAFOSR230382, PE61102F

UNCLASSIFIED PAGE 227 EVK15N

AD-A158 405

AD-A158 397
ABSTRACT: (U) Malin’s (1980) first-order single scattering theory has been extended to study the scattering of surface waves as well as body waves by distributed point scatterers in a layered medium. The scattered waveform itself is generated and examined instead of its energy envelope. The theory used allows: 1) mode conversion; 2) wave type conversion; 3) finite scatterer distribution; and 4) the effect of attenuation from scattering as well as intrinsic absorption. The cases studied are for elastic or slightly attenuative media with any kind of source and receiver at any place in the layered structure. This direct calculation of coda waves provides a simple description of the relation of coda and scattering. The objectives are to find 1) the effect of layering on scattering; 2) the effect of scatterer distribution on recorded vertical and horizontal motion; 3) the relation of scattering to intrinsic Q; 4) the scattering behavior of surface and body waves; and 5) the superposition of scattering waves to form the coda. The generation of body waves by ‘locked mode’ approximation, which makes the body wave a subset of the ‘surface wave,’ is extensively studied.

DESCRIPTORS: (U) *SEISMIC WAVES, *SCATTERING, SURFACE WAVES, WAVE PROPAGATION, ATTENUATION, ABSORPTION, LAYERS, CONVERSION, AMPLITUDE, SEISMIC REFLECTION, SECONDARY WAVES, SHEAR PROPERTIES, APPROXIMATION(MATHEMATICS), YIELD(NUCLEAR EXPLOSIONS), DETERMINATION, SEISMIC DATA, SYNTHESIS, EARTHQUAKES
Effect of Polishing with Different Size Abrasives on the Current Response at a Rotating Disk Electrode,

PERSONAL AUTHORS: Bruckenstein, S.; Sharkey, J. W.; Yip, J. Y.

CONTRACT NO. AFOSR-83-0004

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR

TR-85-0578

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v57 n1 p368-371 Jan 85.

ABSTRACT: (U) In this research group as well as other substantial emphasis has been placed on the surface preparation of rotating disk electrodes. This emphasis exists because the transition to turbulent flow can occur at much lower rotation speeds on a less perfectly polished rotating disk. We thought it worthwhile to study systematically the effect of polishing procedures on the Levich response of a rotating disk electrode. In the rotation speed range 400-8100 rpm, no significant effect on the Levich responses was observed for either gold or platinum RDE's polished with abrasives in the size range 0.5-14 μm. The maximum Reynolds number reached for the RDE's used in this study, radius approximately 0.4 cm, was about 1.4 x 10⁶ and was more than an order of magnitude lower than the critical value for onset of turbulence, 2.2 x 10⁵ to the 4th power. An electrode whose surface appearance is reflective and relatively scratch-free is more than sufficient to obtain ideal Levich behavior. Time-consuming and tedious polishing with submicrometer-sized abrasives is unnecessary. (Author)

DESCRIPTORS: (U) +ELECTRODES, +SURFACE ROUGHNESS, +TURBULENT FLOW, +DISKS, ELECTROCHEMISTRY, ABRASIVES, VOLTAGE, REYNOLDS NUMBER, ROTATION, POLISHING, ELECTRIC
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 388  7/4
CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Collisional Quenching of Excited Iodine Atoms (5P(5)
(2)P1/2) by Cl2 in a Flow System,
MAR 85  9P
Wiesenfeld, J. R.;

CONTRACT NO.  F48620-83-K-0012
PROJECT NO.  2303
TASK NO.  81
MONITOR: AFOSR
TR-85-0539

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v82
n8 p2590-2597.  15 Mar 85.

ABSTRACT: (U) Time-resolves infrared emission from
photolytically generated I*(2P1/2 state) has been studied
in a slow flow apparatus. The total rate of deactivation
of I*(2P1/2 state) by Cl2 has been measured to be no more
than 8 x 10 to the -18CC cm3/molecule, substantially
slower than previous reported. Evidence is presented for
a very fast (k = 10 to the -10 cc/molecule/s) relaxation
of I* by Cl atoms, which can account for both the earlier
and the present observations.

DESCRIPTORS: (U) IODINE, ELECTRONIC STATES, PHOTOLYSIS,
EXCITATION, ATOMIC ORBITALS, ATOMIC ENERGY LEVELS,
QUENCHING, CHLORINE, REPRINTS

IDENTIFIERS: (U) PE81102F, WUAFOSR230381

SEARCH CONTROL NO. EVK15N

AD-A158 387  7/4
STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Determination of Gaseous Hydrogen Sulfide by Cathodic
Stripping Voltammetry after Preconcentration on a
Silver Metalized Porous Membrane Electrode,
JUL 84  6P
PERSONAL AUTHORS: Opekari, F.; Bruckenbein, S.;

CONTRACT NO. AFOSR-83-0004
PROJECT NO.  2303
TASK NO.  A1
MONITOR: AFOSR
TR-85-0579

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Analytical Chemistry, v56 n8
p1206-1209 Jul 84.

ABSTRACT: (U) Gaseous H2S is accumulated on the surface
of a porous silver membrane electrode at constant
potential and directly determined by cathodic stripping
voltammetry. The sensitivity of the method, expressed by
the slope of the regression line for the dependence of the
stripping peak current on the amount of H2S in the
gas sample, is 357 micrograms of H2S/micro Amps. The
reproducibility of the determination expressed in terms
of the relative standard deviation is 3.2%. Phenomena
observed during cathodic polarization of the silver
porous membrane electrode, either clean or covered with
deposited Ag2S, are briefly discussed and the resultant
conditions for optimal analysis are given.

DESCRIPTORS: (U) HYDROGEN SULFIDE, ELECTRODES,
VOLTAMMETRY, SILVER, GAS ANALYSIS, SURFACES, TRACER
STUDIES, ELECTROCHEMISTRY, REPRINTS

IDENTIFIERS: (U) Pneumatoamperometry, Cathodic stripping
voltammetry, PE81102F, WUAFOSR2303A1
OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Quasiclassical Trajectory Studies of H(D)+HBr(DBr) Abstraction and Exchange Reactions.

85 16P

PERSONAL AUTHORS: Sudhakaran, M. P.; Raff, L. M.

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-85-0534

ABSTRACT: (U) The abstraction and exchange reaction dynamics for H(D)+HBr(DBr) systems have been investigated on three LEPS potential-energy surfaces whose features are in accord with the surface topography suggested by recent molecular-beam and thermal experiments (abstraction barrier less than 1.0 kcal/mole, exchange reaction barriers of approx. 5.0 kcal/mole, and no attractive wells with a depth greater than 0.20 kcal/mole). The surfaces differ primarily in the magnitude of the abstraction barrier which varies from 0.19 to 1.01 kcal/mole. Reaction cross sections have been computed on each surface as a function of relative collision energy from the results of 139000 quasiclassical trajectories. Comparison of these results with measured relative abstraction cross sections suggests that the true abstraction barrier is very small, perhaps between 0.0 and 0.25 kcal/mole. However, thermal rate coefficients computed on the best surface at 300 K are about a factor of 2 larger than the most recently measured values. The calculated (H,D)/(D,H) isotope ratio at 300 K lies between the two reported experimental results. The computed thermal activation energy for abstraction is 835 kcal/mole, which is in good agreement with a very early measurement but a factor of 2.8 less than the most recently reported experimental result. These results
(U) Diagnostical Measurements in a Single Electrode Atmospheric Pressure, Microwave Plasma, 84 10P

PERSONAL AUTHORS: Kirsch, B.; Hanamura, S.; Winefordner, J. D.

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-85-0523

UNCLASSIFIED REPORT


ABSTRACT: (U) Several important diagnostic parameters are determined for a single electrode atmospheric pressure plasma system described by Hanamura et al. 1,2. These include excitation temperatures and electron number densities and electron temperatures for various plasma gases at several different input powers. The variation of emission intensity with various plasma gases and their mixtures is investigated, as well as the effect of the chemical form of the sample on emission intensity, for the purposes of optimizing operating conditions for emission spectrochemical analysis. (Author)

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *ELECTRODES, COUPLING(INTERACTION), MICROWAVE EQUIPMENT, BAROMETRIC PRESSURE, CAPACITANCE, WATER VAPOR, REPRINTS, NITROGEN, MAGNETRONS, ARGON, HELIUM

IDENTIFIERS: (U) Microwave plasmas, Diagnostics(Plasma), Plasma Temperature, NPC(Microwave induced plasma), PE61102F, WUAFOSR2303A1

AD-A158 372
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Linear Polysiloxanes from Dichlorosilane.

84 7P

PERSONAL AUTHORS: Seyferth,D.; Prud'homme,C.C.;

CONTRACT NO. AFOSR-83-0003

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR TR-85-0520

UNCLASSIFIED REPORT


ABSTRACT: (U) Polysiloxanes of type RR'R'SiO(SiH2O)nSiRR'R(R',R'' = Me,Me,Me; Me,H,H; Et,Et,Et; Me,Me,H) have been prepared by three different methods: (1) reactions of C15H20(SiH2O)nSiH2Cl with CH3MgBr, Me3SiOH, and Et3SiOH; (2) H2SO4-catalyzed equilibration of cyclic (H2SiO)n oligomers with Me3SiOSiMe3; (3) cohydrolysis of H2SiCl2 with Me3SiCl and Me2HSiCl using NaH2PO4/Na2HPO4-buffered media. Lower species, Me21R10Si(SiH2O)nSiMe2R (n = 1-3), were isolated and characterized (R = Me, H).

(Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *POLYMERS, *SILOXANES, SILICON COMPOUNDS, CHLORIDES, HYDRIDES, ORGANIC COMPOUNDS, HYDROLYSIS, SILANES, REPRINTS

IDENTIFIERS: (U) Polysiloxanes, PB81102F, WAFO5R23093B2

SEARCH CONTROL NO. EV15N

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) The Hydrolysis of Dibromo fluoromethyl Triphenylphosphonium Bromide.

82 7P

PERSONAL AUTHORS: Burton,D. J.; Flynn, R. M.; Manning, R. G.; Kessler, R. M.;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR TR-85-0522

UNCLASSIFIED REPORT


ABSTRACT: (U) Hydrolysis of (Ph3PCBr2)Br(-) afforded a high yield of dibromofluoromethane and triphenylphosphine oxide. Hydrolysis in the presence of a radioactive isotope of bromine gave evidence that the mechanism of this reaction proceeds via the dibromofluoromethide ion and not via a bromofluorocarbene intermediate. (Author)

DESCRIPTORS: (U) *HYDROLYSIS, *BROMIDES, *PHOSPHONIUM COMPOUNDS, FLUORINE COMPOUNDS, METHYL RADICALS, PHENYL RADICALS, OXIDES, METHANE, SALTS, REPRINTS

IDENTIFIERS: (U) Bromide/ dibromofluoromethyl triphenylphosphonium, PE81102F, WAFO5R2303B2
FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY


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

CONTRACT NO. F49620-84-C-0002

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-85-0524

UNCLASSIFIED REPORT


ABSTRACT: (U) The Hitachi Zeeman atomic absorption spectrometer system is used to evaluate the influence of observation height and C2H2 flow rate upon the atomic absorption sensitivity (slope of calibration curve) and upon the atomic absorption signals for 6 elements in an C2H2/Air flame and for 3 elements in an C2H2/N2O flame. Fuel-rich conditions result in greater absorption signals and sensitivities in all cases even though there is a significant temperature drop. Optimal observation heights for each case are evaluated. Greater linearity of analytical calibration curves occurs for fuel-rich conditions under Zeeman background correction than under no background correction. The Zeeman atomic absorption flame spectrometer should find more use in the future. (Author)

DESCRIPTORS: (U) *SPECTROMETRY, *ATOMIC SPECTROSCOPY, *ABSORPTION SPECTRA, *FLAMES, FUEL AIR RATIO, HYDROCARBONS, NITROUS OXIDE, ZEEMAN EFFECT, REPRINTS

IDENTIFIERS: (U) Atomic absorption spectrometry.

PE61102F, WUAFOSR2303A1

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BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

The Synthesis and X-Ray Crystal Structure of the Hexanuclear Metal Cluster Complex (Ir3Pt3(mu-CO)3(CO) 3(eta5-CSMe5)3).

PERSONAL AUTHORS: Freeman, W. J.; Miles, A. D.; Murray, M.; Orpen, A. G.; Stone, F. G. A.

CONTRACT NO. AFOSR-82-0070

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-85-0541

UNCLASSIFIED REPORT


ABSTRACT: (U) The compounds Ir(CO)2(eta5-CSMe5) and Pt(C2H4)3 in diethylether at 0 C react to give the cluster complex Ir3Pt3(Mu-CO)3(CO)3(eta5-CSMe5)3 in quantitative yield. The structure of the hexanuclear metal species was established by X-ray diffraction. The main feature is a near-planar array of metal atoms with a central triangle of platinum atoms (Pt-Pt (mean): 2.703(3) A) each edge-brided by an iridium atom (Ir-Pt (mean): 2.887(3) A). The iridium atoms are each 1igated by an eta5-CSMe5 group and by two CO ligands. Three of the latter are essentially terminally bound to Ir and lie approximately orthogonal to the Ir3Pt3 plane, and three bridge between Pt and Ir and lie close to the hexagonal plane. The 13C-{1H} NMR data for the cluster reveal that the carbonyl groups and eta5-CSMe5 ligands undergo dynamic behaviour in solution and possible mechanisms for ligand site exchange are discussed. (Author)

DESCRIPTORS: (U) *SYNTHESIS(CHEMISTRY), *CRYSTAL STRUCTURE, *METAL COMPLEXES, CLUSTERING, X RAY DIFFRACTION, CHEMICAL BONDS, LIGANDS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2

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DTIC REPORT BIBLIOGRAPHY

AD-A158 339 7/3
NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Heptacyclo (5.5.1.14,10.02.0.03,11.05.9.08,12) tetradecane-13,14-bis (spiro-1 prime-cyclopentane): A New C22H28 Noncyclic Cage Hydrocarbon. Improved Synthesis Bicyclo (2.2.1) hepta-2,5-diene-7-spiro-1 prime-cyclo-pentane, 85 4P

PERSONAL AUTHORS: Marchand, A. P.; Wu, A. H.

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0519

UNCLASSIFIED REPORT


ABSTRACT: (U) An improved, five step synthesis of bicyclo(2.2.1) 2.2-hepta-2,5-diene-7-spiro-1'-cyclopentane (1) which affords this material in 15% overall yield (starting with cyclopentadiene) has been developed. Thermal reaction of 1 with iron pentacarbonyl results in cyclodimerization of 1, thereby affording heptacyclo 5.5.1.14(4,10).0(2,8).03.11.05(5,9).0(8,12) tetradecane (3) in 41% yield. Compound 3 is a dendroasymmetric molecule with a perpendicularar structure belonging to point group D2d. (Author)

DESCRIPTORS: (U) SYNTHESIS (CHEMISTRY), HYDROCARBONS, CYCLIC COMPOUNDS, PENTANES, DIENES, DIMERS, CYCLOPENTANES, PENTADIENES, REPRINTS

IDENTIFIERS: (U) PE81102F, WAFOSR230382

AD-A158 339

SEARCH CONTROL NO. EVK15N

AD-A158 333 7/4 7/3

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING

(U) Adsorption and Desulfurization of Thiophene on Nickel(111), 85 9P

PERSONAL AUTHORS: Schoofs, G.; Preston, R.; Benziger, J.

CONTRACT NO. AFOSR-82-20332

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0532

UNCLASSIFIED REPORT


ABSTRACT: (U) The adsorption and desulfurization of thiophene on clean and sulfided Ni(111) surfaces were studied with LEED, AES, TPR, and RAIS. The RAIS data indicate that thiophene adsorbs with its ring parallel or nearly parallel to the surface below room temperature. On clean Ni(111), thiophene polymerizes slightly above room temperature, as evidenced by paraffinic and aromatic C-H stretches in the reflection infrared spectrum and TPR product yields. Decomposition of the polymer aggregates produces a wide variety of hydrocarbons including C5 fragments at 470 K. On a more acidic sulfided Ni(111) surface (Theta subscripts = 0.19), thiophene appears to undergo electrophilic attack at an alpha-carbon as evidenced by TPR products and by methane evolution from the reaction of 2,5-dimethylthiophene. An electrophilic attack by a surface metal atom at an alpha-carbon of thiophene is discussed in terms of molecular orbital theory.

DESCRIPTORS: (U) THIOPHENES, ADSORPTION, DESULFURIZATION, SURFACE CHEMISTRY, REFLECTION, INFRARED SPECTRA, CHEMICAL ATTACK (DEGRADATION), NICKEL, REPRINTS

IDENTIFIERS: (U) Electrophilic reactions, PE81102F, WAFOSR230382

AD-A158 333

UNCLASSIFIED PAGE 235 EVK15N
ABSTRACT: (U) A method to measure the size and velocity of individual particles in a flow is discussed. Results are presented for controlled monodisperse sprays and compared to flash photographs. Typical errors between predicted and measured sizes are less than 5%. Experimental results of the probe volume size are satisfactorily compared to a theoretical algorithm. A very simple optical apparatus is described and used to characterize a spray produced by a simplex nozzle. The size distribution and the Sauter mean diameter of this spray are presented as a function of position and pressure. Originator-supplied keywords: Droplet sizing, Particle velocity, Mass flux, Nonintrusive, Advanced laser diagnostics.

DESCRIPTORS: (U) *SPRAYS, *DROPS, ALGORITHMS, DIAGNOSIS(GENERAL), DIAMETERS, FLASHES, FLUX(RATE), FUNCTIONS, LASERS, MASS FLOW, MEAN, OPTICAL EQUIPMENT, PARTICLES, PHOTOGRAPHS, POSITION(LOCATION), PROBES, SIZES(DIMENSIONS), VELOCITY, VOLUME, MEASUREMENT, PARTICLE SIZE, LASER BEAMS, DIAGNOSTIC EQUIPMENT, LASER VELOCIMETERS, INTERFEROMETRY, SPRAY NOZZLES, ALGORITHMS

IDENTIFIERS: (U) Monodisperse sprays, Flash photographs, Droplet size measurement, Simplex spray nozzles, PE81102F,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 314 21/8.2 21/2 20/4

ALABAMA UNIV IN HUNTSVILLE DEPT OF MECHANICAL ENGINEERING

(U) Multi-Dimensional Combustion Instability Analysis of Solid Propellant Rocket Motors.

DESCRIPTIVE NOTE: Final rept. 15 Mar 83-14 Mar 85, MAY 85 47P

PERSONAL AUTHORS: Chung, T. J.;

CONTRACT NO. AFOSR-83-0084

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-85-0567

UNCLASSIFIED REPORT

ABSTRACT: (U) Analytical models are developed for the multi-dimensional combustion instability analysis of solid propellant rocket motors. This research was motivated by the need for improvement of the current practice in combustion instability analysis. For example, the burning rates and response functions are affected by the extremely complex flowfield. The flow is three-dimensional or at least two-dimensional in axisymmetric geometries; vortex motions and turbulent flows must be adequately calculated; the coupling mechanism of acoustic and hydrodynamic wave oscillations and particle damping should be clarified. These flowfield phenomena, after all, are originated from the flame zone activities - oscillatory behavior of all field variables such as temperature, velocity, pressure, density of the gas, and fuel fractions. The response functions, which serve as boundary conditions for the flowfield can be calculated from the first and second order perturbation eigenvalue analyses of the flame zone governing equations. The effect of velocity coupling appears, naturally, in the second order (nonlinear) solutions. All calculations are carried out using the finite element method. Some of the findings are summarized.

DESCRIPTORS: (U) *COMBUSTION STABILITY, *FINITE ELEMENT

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY

AD-A158 311  20/12

WISCONSIN UNIV-MADISON DEPT OF PHYSICS

(U) Thin Superconducting Film Characterization by Surface Acoustic Waves.

DESCRIPTIVE NOTE: Research progress rept. 30 Sep 84-22 Apr 85.

APR 85  11P

PERSONAL AUTHORS: Levy, N. ;

CONTRACT NO. AFOSR-84-0350

PROJECT NO. 2308

TASK NO. C1

MONITOR: AFOSR

TR-85-0528

UNCLASSIFIED REPORT

ABSTRACT: (U) Both the dc electrical resistivity and the attenuation of surface acoustic waves (SAW) were measured in the superconducting state of a granular lead film as a function of an applied magnetic field normal to the film plane. At 4.2 K the data appear to yield an upper critical of about 80 K Gauss and a lower critical field of about 20 K Gauss. A theoretical model that takes into account renormalization has been developed for explaining the SAW attenuation in a superconducting NbN film with a sheet resistivity of 30 k ohms/sq. Bulk ultrasonic measurements in the ferromagnetic superconductors Er(x) Ho(1-x) Rh4B4 indicate that spin phonon interaction increases in the superconducting state of these ternary compounds. Ultrasonic measurements in very pure vanadium single crystals provide low temperature data which yield a zero temperature energy gap 2 Delta(0) that is very close to the BCS value of 3.5 kT sub c but the data close to the superconducting transition temperature T c would yield 2 Delta(0) x 4.2 kT sub c. A theoretical model is being investigated to ascertain if it will resolve this apparent discrepancy.

DESCRIPTORS: (U) SUPERCONDUCTORS, THIN FILMS, LEAD(METAL), GRANULES, AMORPHOUS MATERIALS, ACOUSTIC MEASUREMENT, SURFACE ACOUSTIC WAVES, ATTENUATION, ENERGY

UNCLASSIFIED

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GAPS, SUPERCONDUCTIVITY, ELECTRICAL RESISTANCE, NI OBium COMPOUNDS, NITRIDES, FERROMAGNETIC MATERIALS, TERNARY COMPOUNDS, VANADIUM, SINGLE CRYSTALS, TRANSITION TEMPERATURE, ULTRASONICS, MAGNETIC FIELDS, CRYOGENICS

IDENTIFIERS: (U) Thin superconducting films, Resistivity, BCS value, PEG1102F, WUAFOSR2306C1
Molecular and Electronic Structures of Metallaspiropentanes,

85 2P

PERSONAL AUTHORS: Gordon, M. S.; Boudjouk, P.;

PROJECT NO. AFOSR-84-0008

TASK NO. B2

MONITOR: AFOSR
TR-85-0571


ABSTRACT: (U) The geometries and stabilities of a silicon and carbon-based spiropentanes are calculated using ab initio methods. The all-silicon compound is found to be more stable than the carbon-containing system. Both charge distribution and strain energy factors stabilize the pentasilaspiropentane relative to the tetrasilaspiropentane structure. (Author)

DESCRIPTORS: (U) ORGANOMETALLIC COMPOUNDS, PENTANES, MOLECULAR STRUCTURE, ELECTRONIC STATES, SILICON COMPOUNDS, CARBON, CYCLIC COMPOUNDS, SILANES, REPRINTS

IDENTIFIERS: (U) Metallosspiropentanes, Silanes, Silenes, PEG1102F, WUAFOSR2303B2


ABSTRACT: (U) Appearance potential measurements on 1,1-dimethyl-1-silaphenalenyl (2, R = X = CH3) and related molecules show that silaphenalenium ions do not delocalize the positive charge throughout the entire π-system like the hydrocarbon phenalenyl. Evidence for short range delocalization by a vinyl group attached to silicon was found in comparing appearance potentials of the silaphenalenium ion 2a with acyclic and saturated analogs. Hydride abstraction reactions using hydride derivatives of 2, 7, and 8 with Ph3C(+)SnCl5(-) did not produce detectable silenyl ions. NMR studies of the 1-silaphenalenyl anion (2c) and related anions indicate that the anion is not highly delocalized. Ultrasound accelerates the reaction between potassium hydride and several of the silanes.

DESCRIPTORS: (U) SILANES, ANIONS, METHYL RADICALS, IONS, POTASSIUM COMPOUNDS, HYDRIDES, NUCLEAR MAGNETIC RESONANCE, ULTRASONICS, REPRINTS

IDENTIFIERS: (U) Silaphenalenyl, Silenylen ions, PEG1102F, WUAFOSR2303B2,

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A valence-bond potential-energy surface for silylene dissociation is reported. The VB wave function is written as a linear combination of the four bound eigenfunctions representing the canonical structures for the reactants and products of the two- and three-center dissociation channels. The matrix elements are evaluated semiempirically in a manner that incorporates the available experimental and ab initio CI data into the formalism. The effect of the silicon nonbonded electron pair is incorporated by addition of a bending potential term. Surface gradients are obtained by a generalization of the Hellmann-Feynman theorem. The resulting SiH2 surface gives the correct bond energies and equilibrium distances for all diatomic products. The calculated reaction endothermicities for all dissociation channels are in agreement with the experimental results to within 6.7% or better. The computed equilibrium bond lengths and bond angle for SiH2 are in fair accord with the corresponding experimental values. The errors in these quantities are ±8.5% and ±9.8%, respectively. The VB surface predicts a back-reaction barrier for Si + H2 yield SiH2 of 0.30 eV, which is in agreement with scaled SCF calculations. There are no attractive wells along the predicted reaction coordinate for three-center dissociation.
A Diagrammatic Approach to Ion Neutralization at Surfaces: On the Validity of First-Order Perturbation Calculations.

ABSTRACT: (U) A theoretical investigation of ion neutralization from positive-ion scattering from surfaces is presented in this reprint. Based on the time-dependent Fano-Anderson potential, a diagrammatic expansion of the reduced density matrix elements of the neutralized atom is given. Strictly speaking, the formalism holds only for systems in which the conduction band is completely empty, i.e., insulators, but conditions are given under which the formalism can be used for ion neutralization at metals. Calculations are performed for the simple case in which the atomic level is not degenerate. The validity of the first-order approximation is analyzed and its contribution to the neutralization probability is found to be dominant provided: (1) the discrete energy level of the atomic projectile is not embedded in the continuum of the valence band of the solid; and (2) the duration of the interaction is sufficiently short, i.e., the collision energy is high enough. (Author)

DESCRIPTORS: (U) *COMPUTATIONS, *PERTURBATIONS, *IONS, *NEUTRALIZATION, ATOMS, NUCLEAR WEAPONS, CONDUCTION BANDS, DIAGRAMS, EXPANSION, INTERACTIONS, TIME, INSULATION, IONS,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 302 7/3
NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) The Synthesis of the First Spiropentasilane, Octamethylspiropentasilane,

84 4P

PERSONAL AUTHORS: Boudjouk, P.; Sooriyakumaran, R.

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0568

UNCLASSIFIED REPORT


ABSTRACT: (U) The action of lithium metal on tetrakis(dimethylbromosilylsilane or tetrakis(dimethylchlorosilylsilane in tetrahydrofuran produces the first spiropentasilane, a highly strained polysilane that undergoes efficient cleavage reactions with lithium aluminum hydride, methylmagnesium bromide, and phosphorus pentachloride. (Author)

DESCRIPTORS: (U) *SYNTHESIS (CHEMISTRY), *POLYSILANES, METHYL RADICALS, LITHIUM, BROMINE, REPRINTS

IDENTIFIERS: (U) WJAOSR230382, PE81102F

AD-A158 301 7/4

PRINCETON UNIV NJ DEPT OF CHEMICAL ENGINEERING


85 20P

PERSONAL AUTHORS: Benziger, J. B.; Preston, R. E.

CONTRACT NO. AFOSR-82-0302, NSF-CPE80-24187

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0530

UNCLASSIFIED REPORT


ABSTRACT: (U) Adlayers of oxygen, carbon, and sulfur on W(211) have been characterized by LEED, AES, TPD, and CO adsorption. Oxygen initially adsorbs on the W(211) surface forming p(2 x 1)O and p(1 x 1)O structures. Atomic oxygen is the only desorption product from these surfaces. This initial adsorption selectively inhibits CO dissociation in the CO(beta 1) state. Increased oxidation leads to a p(1 x 2)O structure which totally inhibits CO dissociation. Volatile metal oxides desorb from the p(1 x 2)O surface at 1850 K. Oxidation of W(211) at 1200 K leads to reconstruction of the surface and formation of p(1 x n)O LEED patterns, 3 < or = n < or = 7. The reconstructed surface also inhibits CO dissociation and volatile metal oxides are observed to desorb at 1700 K, as well as at 1850 K. Carburization of the W(211) surface below 1000 K produced no ordered structures. Above 1000 K carburization produces a c(6 x 4)C which is suggested to result from a hexagonal tungsten carbide overlay. CO dissociation is inhibited on the W(211)-c(6 x 4)C surface. Sulfur initially orders into a c(2 x 2)S structure on W(211). Increased coverage leads to a c(2 x 6)S structure and then a complex structure. Adsorbed sulfur reduces CO dissociation on W(211), but even at the highest sulfur coverages CO dissociation was observed. Sulfur was found to desorb as atomic S at 1850 K for sulfur coverages less
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

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AD-A158 293 3/1 20/5

OKLAHOMA STATE UNIV STILLWATER SCHOOL OF ELECTRICAL AND
COMPUTER ENGINEERING

(U) Modeling a Large Ring Resonator Gyroscope.

DESCRIPTIVE NOTE: Final rept. 1 Feb 84-31 Jan 85,
MAR 85 14IP

PERSONAL AUTHORS: Bilger,H. R.

PROJECT NO.: AFOSR-84-0058

TASK NO.: B2

MONITOR: AFOSR

TR-85-0526

UNCLASSIFIED REPORT

ABSTRACT: (U) The results obtained can be divided into
three categories: a) A feasibility study with focus on
quantum noise and low frequency noise b) Basic modeling
of the ring with Gaussian beam and ray matrices c)
Technical design: Effect of residual gas in ring on
quality factor and light drag, scanning of beam, effect
of misalignment and mismatch of source to ring,
calibration procedures. The results show no obstacle yet
to the goal of achieving a sensitivity of rotation rate
of better than 10 to the -19th power (earth rate) in
rings of 60 sq m size. Such a sensitivity which
corresponds to a change of earth surface velocity of
smaller than 4 cm/day, should surpass Lunar ranging
methods, Lageos methods as well as VLBI-methods in
accuracy, besides being a 'real time' observational
method for earth rotation.

DESCRIPTORS: (U) *EARTH(PLANET), *GYROSCOPES, *ROTATION,
ACCURACY, CALIBRATION, ROTATION, FOCUSING,
NOISE(ELECTRICAL AND ELECTROMAGNETIC), QUANTUM
ELECTRONICS, DRAG, LIGHT, SIZES(DIMENSIONS), REAL TIME,
MODELS, RATES, SURFACES, VELOCITY, RESONATORS, RINGS, LOW
FREQUENCY, NOISE, MISALIGNMENT, GASES, RESIDUALS, QUALITY,
sensitivity, SCANNING, SOURCES

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B2

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DTIC REPORT BIBLIOGRAPHY

AD-A158 292 21/2 20/4

PITTSBURGH UNIV PA INST FOR COMPUTATIONAL MATHEMATICS AND APPLICATIONS

(U) Flujo no Isometrico en un Combustor de Cuerpo Central con Simetria Axial por el Metodo de Variables Duales (Non-Isometric Flow through a Axisymmetric Central Body Combustor via the Dual Variable Method).

85 14P

PERSONAL AUTHORS: Hall, C. A.; Porsching, T. A.

CONTRACT NO. AFOSR-80-0178, AFOSR-84-0131

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-85-0632

UNCLASSIFIED REPORT


ABSTRACT: (U) A predictive model to analyze the problems of fluid dynamics associated with axisymmetric center body combustors using the dual variables approach is presented. The numerical procedure developed is applied to the study of the isothermal and non-isothermal flow in a combustor. (Reprints)

DESCRIPTORS: (U) *COMBUSTION, AXISYMMETRIC, BODIES, COMBUSTORS, NUMERICAL METHODS AND PROCEDURES, REPRINTS, VARIABLES, THERMAL PROPERTIES, FLUID DYNAMICS, MATHEMATICAL PREDICTION, REPRINTS

IDENTIFIERS: (U) Center body combustors, WUAFOSR2304A3, PEB1102F

UNCLASSIFIED


ABSTRACT: (U) Our object is to describe the kinetics of semiconductor-based photo-electrochemical cells in terms of rigorously specified light and mass transport fluxes. In general, choosing the latter two experimentally controllable variables provided practical tests. The theory treats the total voltage applied across the semiconductor/solution interface as the sum of the voltage drop across the semiconductor and the potential associated with the electrochemical process. In particular, choosing the individually well-understood pair of elements (p-n Si, Mg dissolution) allowed us to test two aspects of the theory. One aspect requires an a priori model of both the semiconductor and electrochemical current-voltage responses. The second, more general approach describes the response in terms of the individual impedances of the semiconductor and electrochemical cell, and require no detailed mechanistic knowledge. Agreement between experiment and theory for both approaches was excellent. Keywords include: photoelectrochemical cell, semiconductor electrochemistry, and mass and light flux control.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *PHOTOELECTRIC CELLS(SEMICONDUCTOR), *MASS TRANSFER, *PHOTOCONDUCTIVITY.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVK15N

CONTROL, ELECTRIC CURRENT, FLUX(RATE), INTERFACES, LIGHT,
PHOTOCHEMICAL REACTIONS, RESPONSE, SEMICONDUCTORS,
SOLUTIONS(GENERAL), VARIATIONS, VOLTAGE, SEMICONDUCTOR
JUNCTIONS, P TYPE SEMICONDUCTORS, N TYPE SEMICONDUCTORS,
SILICON, MERCURY, PHOTOVOLTAIC EFFECT

IDENTIFIERS:  (U) WUAFOSR2303A1, PE81102F

AD-A158 282  CONTINUED

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD QUANTUM
CHEMISTRY GROUP

(U) Application of Quantum Chemistry to Atmospheric
Chemistry.

DESCRIPTIVE NOTE:  Final rept. 1 Oct 83-30 Sep 84.
SEP 84 118P

PERSONAL AUTHORS:  Krauss,N.;Stevens,W. J.;

CONTRACT NO.  AFOSR-ISSA-84-0000
PROJECT NO.  2301
TASK NO.  A4

MONITOR:  AFOSR
TR-85-0563

UNCLASSIFIED REPORT

ABSTRACT:  (U) Analysis of the accuracy of the
experimentally deduced dissociation energies of
refractory metal salts requires a knowledge of the
electronic structure of the molecules. Relativistic
effective potentials (REP) have now made such
calculations for metal containing molecules possible. The
present report will describe our tests and applications
of the effective potential method. We have just completed
a review of the use of effective potentials in molecular
quantum chemistry. The review is given in Section 2. In
Section 3 the abstract is given for the paper on
Relativistic Effective Potential SCF Calculations of AgH
and AuH, which has been accepted by the Journal of
Computational Chemistry. The preprint for the analysis of
the Electronic Structure of FeO and RuO is given in
Section 4. Analysis of the orbital structure establishes
the basis for an aufbau for the ground state of all the
transition metal oxides in the first two rows.
Preliminary results were reported for NdO+, NdO, and UO.
In last years report but a new set of CEP are now being
developed for the lanthanides and actinides. This is a
preliminary to a study of other lanthanide oxides and to
polyatomic systems using the CEP. The abstract for the
paper Compact Effective Potentials and Efficient Shared-
Exponent Basis Sets for the First- and Second-Row Atoms
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 282 CONTINUED

is given in Section 5. Application to the analysis of the spectra of Al₂ is described in the abstract for the paper Electronic State of Al₂.

DESCRIPTORS: (U) *ATMOSPHERIC CHEMISTRY, *QUANTUM CHEMISTRY, ACCURACY, ACTINIDE SERIES, CHEMICAL DISSOCIATION, ELECTRONIC STATES, ENERGY, GROUND STATE, MOLECULES, OXIDES, POLYATOMIC MOLECULES, RARE EARTH ELEMENTS, REFRACTORY METALS, SALTS, TRANSITION METAL COMPOUNDS, MOLECULAR STRUCTURE, MOLECULAR ORBITALS, ALUMINUM

IDENTIFIERS: (U) VJAFOSR2301A4, PE01102F

AD-A158 280 10/2

RASOR ASSOCIATES INC SUNNYVALE CA

(U) Close-Spaced High Temperature Knudsen Flow.

DESCRIPTIVE NOTE: Annual rept. 16 May 84-15 May 85, JUN 85 16P

PERSONAL AUTHORS: McVey, J. B.;

REPORT NO. NSR-22-3

CONTRACT NO. F49620-83-C-0068

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR

TR-85-0578

UNCLASSIFIED REPORT

ABSTRACT: (U) This work continued to investigate thermionic energy conversion in the Knudsen (collisionless) operating mode. A SAVTEC-type converter with an interelectrode spacing of 18-22 microns was tested over a range of emitter temperatures up to about 1700 K. Maximum performance followed the predictions of vacuum-mode analysis for emitter temperatures below 1580 K. Above that temperature the converter operated in the unignited mode, with partial space-charge neutralization by surface ionization of cesium. It was found that collisionless and diffusion mode theories could be extended into the regime of maximum output power for the unignited mode (spacing and electron mean-free path about equal) to give good agreement with the experimental data. The Knudsen-mode thermionic converter with a structured emitter was also investigated. Analysis has shown that associative ionization between barium and cesium is unlikely to be the cause of the current enhancement observed in previously published work. An analysis which considered the trapping of positive ions in the emitter slots has given good qualitative agreement with published data. Work is continuing on this analysis. Parts for a structured emitter variable spacing converter have been constructed and are being assembled. Keywords: Thermionic energy conversion; Knudsen operating mode; Structured...
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

AD-A158 280 CONTINUED

emitter; SAVTEC diodes.

DESCRIPTIONS:
(U) THERMIONIC CONVERTERS, THERMIONIC EMISSION, BARIUM, CATIONS, CESIUM, DIFFUSION THEORY, DIODES, EMITTERS, ENERGY, ENERGY CONVERSION, IONIZATION, NEUTRALIZATION, SLOTS, SPACE CHARGE, SURFACE PROPERTIES, TEMPERATURE, TRAPPING CHARGED PARTICLES, IONIZATION, MOLECULAR PROPERTIES, HIGH TEMPERATURE

IDENTIFIERS:
(U) Knudsen flow, SAVTEC diodes, Collisionless flow, Structured emitters, MUAF0SR2308A1, PE81102F

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

AD-A158 279 7/4

(U) Detection of Polycyclic Aromatic Hydrocarbons by Active Nitrogen-Induced Chemiluminescence.

84 11P

PERSONAL AUTHOR(S): Jurgensen, H. A.; Yu, T.; Winefordner, J. D.;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0536

UNCLASSIFIED REPORT


ABSTRACT: (U) A gentle molecular excitation source based upon energy transfer from metastable nitrogen molecules in a nitrogen afterglow is presented. A dielectric discharge through flowing nitrogen is shown to generate a large population of metastable nitrogen molecules and very few nitrogen atoms. The effect of adding argon or helium to the afterglow is described. Chemiluminescence spectra of benzene, naphthalene and anthracene are presented. Limits of detection (LODs) for several polycyclic aromatic hydrocarbons (PAHs) and hydrocarbons are listed for single and multichannel detection. Most LODs with single channel detection are in the tenths of a nanogram range. Multichannel detection limits are poorer. Initial results of a hydrocarbon and a PAH mixture separated on a gas chromatographic column and multichannel detection are presented.

DESCRIPTIONS:
(U) CHEMILUMINESCENCE, NITROGEN, AROMATIC HYDROCARBONS, POLYCYCLIC COMPOUNDS, SPECTRA, BENZENE, NAPHTHALENES, ANTHRACENES, REPRINTS

IDENTIFIERS:
(U) MUAF0SR2303A1, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 274 9/2

MICHIGAN UNIV ANN ARBOR SUPERCOMPUTER ALGORITHM RESEARCH LAB

(U) Sparse Elimination on Vector Multiprocessors.

DESCRIPTIVE NOTE: Interim rept. 1 Nov 84-1 Apr 85, APR 85 7P

PERSONAL AUTHORS: Calahan, D. A.

CONTRACT NO. AFOSR-84-0098

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0542

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of microtasking with up to 16 CRAY X-MP processors for LU decomposition of dense systems of equations have given rise to hybrid algorithms. One issue addressed has been the problem of memory bank conflicts, which increases with the number of processors. Conflict resistant algorithms have been developed. It is possible to assemble-code the X-MP so that accesses are pre-fetched into vector registers. Several reports have been prepared recently under this effort, and a paper entitled 'Task Granularity Studies in a Many-Processor Cray X-MP' has been accepted for publication in 'Parallel Computing'.

DESCRIPTORS: (U) *ALGORITHMS, *MULTIPROCESSORS, CONFLICT RESISTANCE, ELIMINATION, REGISTRY(S), VECTOR ANALYSIS, HIGH DENSITY, VECTOR ANALYSIS, EQUATIONS, DATA STORAGE SYSTEMS, DATA MANAGEMENT

IDENTIFIERS: (U) Conflict resistant algorithms, Hybrid algorithms, Memory bank conflicts, WUAFOSR2304A2, PEB1102F

SEARCH CONTROL NO. EVK15N

AD-A158 273 20/5

PHYSICAL SCIENCES INC ANDOVER MA

(U) Experimental and Theoretical Studies of Laser Propulsion Phenomenology.

DESCRIPTIVE NOTE: Final technical rept. 15 Jan 84-28 Feb 85, MAR 85 37P


REPORT NO. PSI-039, TR-505

CONTRACT NO. F49620-83-C-0039

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0577

UNCLASSIFIED REPORT

ABSTRACT: (U) The work performed in this 2-year effort involved two tasks: one dealing with issues related to laser energy absorption in a pulsed thruster and the other dealing with issues related to laser energy absorption in a CW thruster. For the pulsed studies, the first year's effort involved theoretical and experimental investigations of the threshold requirements for achieving laser-induced gas breakdown at short wavelengths (<1 micrometer). With these breakdown studies completed, the next step, initiated in the second year, was to determine the degree of pulsed laser energy absorption that can be achieved in the laser-initiated plasma. Toward this end pulsed laser energy deposition studies were performed using a pulsed Nd-glass laser as the energy source (wavelength = 1.05 micrometers, pulse duration = 20 ns) and high pressure hydrogen and argon gases as the absorption media. The percentage of laser energy absorbed in the laser-produced plasma was determined from measurements of the fraction of laser energy transmitted through the breakdown region as well as from optical interferometric measurements to determine the strength of the laser-produced blast wave. The
Initially deposited energy was inferred from the measured blast wave trajectories by comparing them with predicted trajectories calculated by a detailed hydrodynamic model. Results are presented for the energy deposition efficiency achieved in argon and hydrogen as a function of initial gas pressure (0.3 atm < P < 10 atm).

DESCRIPTORS: (U) *PROPULSION SYSTEMS, *PULSED LASERS, *THRUSTERS, ABSORPTION, ARGON, BREAKDOWN(ELECTRONIC THRESHOLD); DEPOSITION, EFFICIENCY, ENERGY, GASES, PRESSURE, HYDRODYNAMICS, MODELS, ABSORPTION, MEDIA, ARGON, SOURCES, HIGH PRESSURE, HYDROGEN, LASERS, BLAST WAVES, INTERFEROMETRY, MEASUREMENT, OPTICAL PROPERTIES, PULSES, SHORT WAVELENGTHS, REQUIREMENTS, THRESHOLD EFFECTS, ENERGY, PLASMAS(PHYSICS), ENERGY ABSORBERS, THEORY, TRAJECTORIES

IDENTIFIERS: (U) WJAFOSR2303A1, PE81102F

SUPPLEMENTARY NOTE: See also Appendix 1, AD-A158 271. Sponsored in part by Grant NSF-AST82-01092.


DESCRIPTORS: (U) *IMAGE PROCESSING, *INTERFEROMETRY, MIRRORS, TELESCOPES, ARIZONA, OPTICAL INTERFEROMETERS, SIGNAL PROCESSING, HIGH RATE, ADAPTIVE SYSTEMS, OPTICS, ASTRONOMY, SPECULAR REFLECTION, CALIBRATION, INTERFEROMETERS, DIGITAL SYSTEMS, DIAMETERS, PHYSICAL PROPERTIES, HOLOGRAPHY, IMAGES, ASTEROIDS, BINARY STARS, ORIENTATION(DIRECTION), COMPARISON, SYNCHRONOUS SATELLITES, POWER SPECTRA, INTENSITY, IMAGES, STATISTICAL ANALYSIS, STARS

IDENTIFIERS: (U) *Speckle interferometry, Image
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 272  CONTINUED

reconstruction, MMT (Multiple Mirror Telescope), Adaptive optics

SEARCH CONTROL NO. EVK15N

AD-A158 271   3/2

STEWART OBSERVATORY TUCSON ARIZ


DESCRIPTIVE NOTE: Final rept.,

APR 85   56P

PERSONAL AUTHORs: Strittmatter, P. A.; Hegge, E. K.;

CONTRACT NO. F19628-82-0025, NSF-AST81-13212

MONITOR: AFOSR

TR-85-0635-APP-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendix 2, AD-A158 272. Sponsored in part by Grant NSF-AST82-01082.

ABSTRACT: (U) By adjusting the optical pathlengths of the MMT (Multiple Mirror Telescopes) telescopes, it is possible to make the MMT into a phased array with a 8.86 m baseline. A coherent, phased focus can be achieved with tilted focal planes if the tilt angle is chosen so that the internal phase differences exactly compensate the external phase differences. This amounts to a slight change in configuration such that the beams are brought together at f/8.39 rather than the originally designed f/9. We summarize experiments which have used the MMT subapertures as a phased array and as a coherent, phased telescope, and present a simple analysis of the tilted focal plane geometry for coherent observation. The phased operation of the MMT is important not only for obtaining high angular resolution, but also for obtaining the higher detection sensitivity which results from the better discrimination against the sky emission background for infrared diffraction limited images. Full-aperture (six-beams), diffraction-limited results for the unresolved source Gamma Orions, the well-known close binary Capella and the resolved red supergiant Betelgeuse, (including a diffraction limited differential speckle image of the latter) are presented.

DESCRIPTORS: (U) *TELESCOPES, *INFRARED IMAGES, COHERENCE, OBSERVATION, PHASE, EXTERNAL, DIFFRACTION, LIMITATIONS, PHASED ARRAYS, BACKGROUND, FOCUSING, DETECTION, SENSITIVITY, ANGLES, HIGH RESOLUTION, INTERNAL,

AD-A158 272
UNCLASSIFIED

OPERATION, SPECULAR REFLECTION, EMISSION, SKY, PLANE
GEOMETRY, TILT, FOCAL PLANES

AD-A158 271 CONTINUED

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

DESCRIPTIVE NOTE: Technical rept.,
MAY 85 11P
PERSONAL AUTHORS: Alzaid, A. A.; Rao, C. R.; Shanbhag, D. N.
REPORT NO. TR-85-19
CONTRACT NO. F49620-85-C-0006
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0549

UNCLASSIFIED REPORT

ABSTRACT: (U) A new proof is given using de Finetti's
theorem on infinite sequence of exchangeable random
variables for the solution of the integrated Cauchy
functional equation studied by Lau and Rao (1982) in the
continuous case and by Shanbhag (1977) in the discrete
case. (Author)

DESCRIPTORS: (U) *EQUATIONS, *FUNCTIONAL ANALYSIS,
INTEGRATED SYSTEMS, THEOREMS, CAUCHY PROBLEM, RANDOM
VARIABLES, SEQUENCES (MATHEMATICS), SOLUTIONS (GENERAL)

IDENTIFIERS: (U) De Finetti's theorem
ABSTRACT: (U) In this paper, the authors considered the likelihood ratio tests and some other tests for the ranks of the canonical correlation matrices when the underlying distributions are real and complex elliptically symmetric distributions. Also, asymptotic joint distributions of the eigenvalues of the sample canonical correlation matrices are derived under the assumptions mentioned above regarding the underlying distributions. Finally, applications of tests for the rank of the complex canonical correlation matrix in the area of time series in the frequency domain are discussed. Originator-supplied keywords: Asymptotic distributions, Complex distributions, Canonical correlations, Elliptical distribution; Time series.

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, *SIGNAL TO NOISE RATIO, REGRESSION ANALYSIS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304AS
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 256  12/1
PITTSBURGH UNIV  PA CENTER FOR MULTIVARIATE ANALYSIS
(U) Spectra for Large Dimensional Random Matrices.
DESCRIPTIVE NOTE: Technical rept.,
MAY 85  14P
PERSONAL AUTHORS:  Yin, Y. Q.; Bai, Z. D.;
REPORT NO.  TR-85-17
CONTRACT NO.  F49620-85-C-0008
PROJECT NO.  2304
TASK NO.  A5
MONITOR:  AFOSR
TR-85-0547

UNCLASSIFIED REPORT

ABSTRACT: (U)  In this paper, the authors reviewed some recent developments in the area of large dimensional random matrices. Originator-supplied keywords:
Eigenvalues; Large dimensions; Largest eigenvalue;
Limiting spectral distribution; Multivariate F matrix;
Random matrices; Sample covariance matrix; Smallest eigenvalues.

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

IDENTIFIERS: (U)  *Random matrices, F matrix

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 255  12/1
PITTSBURGH UNIV  PA CENTER FOR MULTIVARIATE ANALYSIS
(U) On Asymptotic Distribution of the Test Statistic for
the Mean of the Non-Isotropic Principal Component.
DESCRIPTIVE NOTE: Technical rept.,
MAY 85  16P
PERSONAL AUTHORS:  Fang, C.; Krishnaiah, P. R.;
REPORT NO.  TR-85-20
CONTRACT NO.  F49620-85-C-0008
PROJECT NO.  2304
TASK NO.  A5
MONITOR:  AFOSR
TR-85-0551

UNCLASSIFIED REPORT

ABSTRACT: (U)  Data analysts are often confronted with
the problem of large dimensional data. In some of these
situations, it is customary to reduce the dimensionality
of the problem by using principal component analysis and
to perform statistical analysis of the data using the new
variables (principal components). For example, the new
variables are used in the area of classification.
Cheesnut and Floyd (1981) used the principal components
as variables in identification of underwater targets.
However, the statistical data analysis using the
principal components is ad hoc since the distributions of
the test statistics based upon the principal components
are complicated when the covariance matrix is unknown.
Very little work was done in the literature on deriving
the distributions of these test statistics even in the
asymptotic case. In this paper, we derive the asymptotic
distribution of the t statistic based upon the new
variable (the most important principal component) instead
of using any of the original variables. The above
asymptotic distribution is shown to be Student's t
distribution. The accuracy of the above approximation is
studied by comparing the simulated values using the
asymptotic expression with the standard Student's t table.
It is found that the accuracy of the above approximation

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UNCLASSIFIED
is sufficient for many practical situations.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *STATISTICAL DATA, ACCURACY, ANALYSTS, ANISOTROPY, ASYMPTOTIC SERIES, CLASSIFICATION, DISTRIBUTION, IDENTIFICATION, MEAN, SIMULATION, STATISTICAL TESTS, STUDENTS, UNDERWATER TARGETS, VALUE, VARIABLES

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

AD-A158 255 CONTINUED

AD-A158 237 9/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Idiot's Guide to OZ: A Manual for the Complete Beginner, Introducing EMACS, the Word Processing Program, and TEX, the Text Formatting Program, 84 72p

PERSONAL AUTHORS: Gilson, W.

CONTRACT NO. F49620-83-C-0135, NSF-MCS79-23110

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR

TR-85-0583

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *TEXT PROCESSING, MINICOMPUTERS, DATA PROCESSING TERMINALS, COMPUTER PROGRAMS, OPERATION, COMPUTER FILES, EDITING, PRINTING, FORMATS, CONTROL, ELECTRONIC MAIL, MANUALS

IDENTIFIERS: (U) *OZ computer, EMACS computer program, Tex computer program, BABYL computer programs, WUAFOSR2313A5, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 229 20/5 20/7
AUSTIN RESEARCH ASSOCIATES INC TX

(U) Theoretical Studies of Two-Dimensional Effects in Free Electron Lasers.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb-31 Oct 84, DEC 84 148P

PERSONAL AUTHORS: Rosenbluth, M. N.; Wong, H. V.; Moore, B. M.;

REPORT NO. I-ARA-84-U-121, ARA-525

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0493

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the development of a two-dimensional numerical simulation of free electron laser code which includes pass-to-pass electromagnetic pulse evolution, wave diffraction, transverse betatron motion of the electrons, and frequency discrimination to suppress the growth of unstable sidebands. The code was used to simulate the experiment recently completed at TRW, the experiment being done at LANL, and the proposed MSNW experiment. The TRW simulations are in qualitative agreement with experimental results. The LANL simulations are similar to the one-dimensional simulations (1-D) previously done. The MSNW simulations exhibit general trends which are similar to those of the MSNW 1-D simulations: in both, frequency discrimination improves the trapping efficiency and produces a smooth optical pulse. This report also discusses the feasibility of steady state operation of tapered wiggler in storage rings. Long smooth optical pulses are necessary to reduce energy spreading in the wiggler. Conventional tapered wigglers appear to require lower circulating power levels than phase area displacement wigglers. Additional keyword: Variable parameter wigglers.

DESCRIPTORS: (U) *BETATRONS, *FREE ELECTRON LASERS, *LIGHT PULSES, MOTION, PATTERNS, LIGHT PULSES, ONE
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A158 206 7/4

RESEARCH TRIANGLE INST RESEARCH TRIANGLE PARK NC

(U) Study of Mean Free Path Effects on Growth of Ultrafine Metallic Aerosols.

DESCRIPTION NOTE: Annual rept. 1 Feb 84-1 Feb 85,

APR 85 20P

PERSONAL AUTHORS: Lavless, P. A.;

CONTRACT NO. F49620-84-C-0017

PROJECT NO. 2306

TASK NO. C4

MONITOR: AFOSR

TR-85-0525

UNCLASSIFIED REPORT

ABSTRACT: (U) In the first year of this study on the dynamics of aerosol formation in gaseous atmospheres, the experimental facility was set up, using an exploding wire generator for the production of high concentrations of metallic aerosols. The initial experiments have been devoted to development of sampling methods for the reduced atmosphere environment and, then, to the observation of the types of behavior exhibited by single component aerosols.

DESCRIPTORS: (U) +AEROSOLS, +METALS, METHODOLOGY, SAMPLING, EXPLODING WIRES, CONCENTRATION(COMPOSITION), HIGH RATE, ATMOSPHERES, ENVIRONMENTS, REDUCTION, ULTRAFINES, AEROSOL GENERATORS, DYNAMICS, GASES, MEAN FREE PATH, PRODUCTION

IDENTIFIERS: (U) WUAFOSR2308C4, PE81102F

AD-A158 123 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Adsorption and Orientation of Aromatic Compounds at Smooth Polycrystalline Platinum Electrodes,

84 7P


CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR

TR-85-0339

UNCLASSIFIED REPORT


ABSTRACT: (U) A recent study has shown that aqueous solutions of weakly surface-active electrolytes such as ClO4(-), HSO4(-), H2PO4(-), PF6(-) and Cs+ do not inhibit the spontaneous and irreversible oriented-adsorption of aromatic molecules at smooth polycrystalline Pt electrodes. Studies using structurally well-defined Pt single-crystals have also demonstrated the inertness of irreversibly adsorbed layers towards these supporting electrolyte solutions. However, initial studies using iodide solutions have indicated that strongly surface-active electrolytes may exert profound influences on the adsorption characteristics of organic compounds. It was observed, for example, that when a layer of flat-adsorbed aromatic intermediates was exposed to dilute aqueous iodide, desorption and/or reorientation of the aromatic species occurred (depending on the nature of the adsorbate snpH of the solution) along with adsorption of iodine. In ultra-high vacuum adsorbed molecule reorientation induced by coadsorption of iodine was indicated for dimethyl sulfoxide chemisorbed on Pt(III). In the present study, the effect of halide supporting electrolytes on the adsorption and orientation of hydroquinone (HQ) and 1,4-naphthohydroquinone (NHQ) at smooth polycrystalline Pt electrodes is examined in
greater detail. This work focuses on competitive adsorption between halide and aromatic when both are present in the same solution in various proportions. Halide influences are indicated by differences in the adsorption profiles relative to the clean surface.

DESCRIPTORS: (U) *ADSORPTION, *AROMATIC COMPOUNDS, *ELECTRODES, *ELECTROLYTES, LAYERS, IODINE, SOLUTIONS(MIXTURES), MOLECULES, SURFACES, DESORPTION, DILUTION, IODIDES, LIQUIDS, SOLUTIONS(GENERAL), ORGANIC COMPOUNDS, PH FACTOR, SURFACE ACTIVE SUBSTANCES, METHYL SULFOXIDE, ORIENTATION(DIRECTION), POLYCRYSTALLINE, PHENOLS, PLATINUM, ULTRAHIGH VACUUM, WATER

IDENTIFIERS: (U) WUAFOSR2303A1, PE61102F


ABSTRACT: (U) This reprint discusses approximation techniques for use in numerical schemes for estimating spatially varying coefficients in continuum models such as those for Euler-Bernoulli beams. The techniques are based on quintic spline state approximations and cubic or linear spline parameter approximations. Both theoretical and numerical results are presented. Additional Keywords: Algorithms; Coefficients; and Structural beams. (Author)

DESCRIPTORS: (U) *CONTINUUM MECHANICS, *BEAMS(STRUCTURAL), NUMERICAL METHODS AND PROCEDURES, ALGORITHMS, APPROXIMATION(MATHEMATICS), CUBIC SPLINE TECHNIQUE, REPRINTS

IDENTIFIERS: (U) Euler bernoulli beams
Numerical Methods for Stiff Systems of Two-Point Boundary Value Problems.

PERSONAL AUTHORS: Flaherty, J. E.; O'Malley, R. E., Jr.

CONTRACT NO. DAAG28-82-K-0197, AFOSR-80-0192

MONITOR: ARD, AFOSR 19512.1-MA, TR-85-0830


ABSTRACT: (U) This document describes the development of numerical procedures for constructing asymptotic solutions of certain nonlinear singularly perturbed vector two-point boundary value problems having boundary layers at one or both endpoints. The asymptotic approximations are generated numerically and can either be used as is or to furnish a general purpose two-point boundary value code with an initial approximation and the nonuniform computational mesh needed for such problems. The procedures are applied to a model problem that has multiple solutions and to problems describing the deformation of a thin nonlinear elastic beam that is resting on an elastic foundation. Additional keywords: reprints; asymptotic series; beams (structural). (Author)

DESCRIPTORS: (U) DEFORMATION, BEAMS (STRUCTURAL), BOUNDARY VALUE PROBLEMS, ASYMPTOTIC SERIES, NUMERICAL METHODS AND PROCEDURES, STIFFNESS, REPRINTS