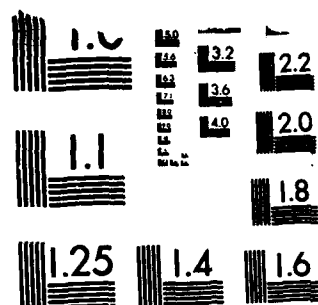




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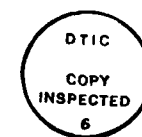
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SUBJECT INDEX

UNCLASSIFIED

SUBJECT INDEX

- *ABNORMALITIES
Reprint: A Stochastic
Characterization of the Sine
Function.
AD-A174 812
- *ACOUSTIC MICROSCOPES
The Air Force Office of
Scientific Research for Low-
Frequency Acoustic Microscope.*
AD-A174 480
- *ADAPTIVE CONTROL SYSTEMS
Reprint: Analysis of an
Identification Algorithm Arising in
the Adaptive Estimation of Markov
Chains.
AD-A175 081
- *AERODYNAMIC CONFIGURATIONS
Closing Developments in
Aerodynamic Simulation with
Disjoint Patched Meshes.*
AD-A174 958
- *AEROELASTICITY
Optimum Aeroelastic
Characteristics for Composite
Supermaneuverable Aircraft.*
AD-A174 785
- *AEROTHERMODYNAMICS
Viscous Interactions at
Hypersonic Speed.*
AD-A174 882
Research on Aero-Thermodynamic
Distortion Induced Structural
Dynamic Response of Multi-Stage
Compressor Blading.*
AD-A175 080
- *AGE HARDENING
Micro-Mechanisms of Deformation
in SiC/Al Composites.*
AD-B107 755
- *AIR FLOW
Flow through a Compressor
Stage.*
AD-A175 026
- *AIR FORCE RESEARCH
Mathematical Techniques for
System Realization and
Identification.*
AD-A174 487
- *AIRCRAFT FIRES
Fuel Spray Ignition by Hot
Surfaces and Stabilization of
Aircraft Fires.*
AD-A174 852
- *AIRFOILS
Active Feedback Interaction with
a Shear Layer.*
AD-A174 544
- *ALGEBRA
Algebraic and Computational
Aspects of Network Reliability and
Problems.*
AD-A175 075
- *ALGORITHMS
A Comparison of Stability and
Convergence Properties of
Techniques for Inverse Problems.*
AD-A174 733
Reprint: A Theorem of I. Schur
and its Impact on Modern Signal
Processing.
AD-A174 881
Summary of Accomplished Work
under the Air Force Grant AFOSR-83-
0229.*
AD-A174 938
Asymptotic Properties of
Distributed and Communicating
Stochastic Approximation
Algorithms.*
AD-A175 028
Fast Algorithms for Structural
Analysis, Least Squares and Related
Computations.*
AD-A175 078
- *ALUMINUM
Reprint: The Effects of Surface
Facets on the Oxidation of Aluminum
(111) Surfaces.
AD-A175 131
- *ALUMINUM ALLOYS
Stress Corrosion Cracking of
Wrought and P/M High Strength
Aluminum Alloys.*
AD-A174 435
Rapid Solidification Processing
and Powder Metallurgy of Al
Alloys.*
AD-A174 553
Investigation and Synthesis of
High Temperature and Increased
Stiffness RSP Aluminum Alloys.*
AD-A174 588
Al and Mg Alloys for Aerospace
Applications Using Rapid
Solidification and Powder
Metallurgy Processing.*
AD-A175 030
Micro-Mechanisms of Deformation
in SiC/Al Composites.*
AD-B107 755
- *ALUMINUM GALLIUM ARSENIDE
Development of a Planar
Heterojunction Bipolar Transistor
for Very High Speed Logic.*
AD-A174 580
- *ANALOG TO DIGITAL CONVERTERS
Department of Defense
Instrumentation Award.*
AD-A174 888
- *ANALYSIS OF VARIANCE
The Effects of Variance Function
Estimation on Prediction and
Calibration: An Example.*
AD-A174 941
Variance Function Estimation.*
AD-A174 981
Variance Functions and the
Minimum Detectable Concentration in
Assays.*
AD-A174 983
- *ANTIGENS

UNCLASSIFIED

Becton-Dickson Model 420
Fluorescence-Activated Cell Sorter
(FACS).
AD-A174 728

*APPLIED MATHEMATICS

Mathematical Techniques for
System Realization and
Identification.*
AD-A174 487
Renewing U.S. Mathematics:
Critical Resource for the Future.*
AD-A174 545
Markovian Shock Models,
Deterioration Processes, Stratified
Markov Processes Replacement
Policies.*
AD-A174 646

*APPROXIMATION(MATHEMATICS)

Reprint: A Theorem of I. Schur
and its Impact on Modern Signal
Processing.
AD-A174 881

*ARCHITECTURE

Optical Symbolic Processor for
Expert System Execution.*
AD-A174 955

*ARRAYS

Electromagnetic Sensor Arrays
for Nondestructive Evaluation and
Robot Control.*
AD-A174 820
Electromagnetic Sensor Arrays
for Nondestructive Evaluation and
Robot Control.*
AD-A174 792

*ASSOCIATIVE PROCESSING

OCCAM First Quarterly Research
and Development Status Report: June-
August 1986.*
AD-A174 957

*ASTRONOMY

Diffraction-Limited Imaging of
Space Objects III.*
AD-A174 100

*ASYMPTOTIC NORMALITY

Asymptotic Properties of
Distributed and Communicating
Stochastic Approximation
Algorithms.*
AD-A175 028

*ATMOSPHERIC PHYSICS

The Morphology of Broken Cloud
Fields over Ocean Surfaces Using
LANDSAT.*
AD-A174 944

*ATMOSPHERIC REFRACTION

Diffraction-Limited Imaging of
Space Objects III.*
AD-A174 100

*ATMOSPHERICS

The Morphology of Broken Cloud
Fields over Ocean Surfaces Using
LANDSAT.*
AD-A174 944

*ATOMIZATION

Dense-Spray Structure and
Phenomena.*
AD-A174 683

*BACKSCATTERING

Research on Certain Aspects of
Laser Diffraction Particle Size
Analysis Relevant to Autonomous
Self-Diagnosing Instrumentation.*
AD-A174 428

*BARRIER COATINGS

A Fundamental Study of the
Bonding of Thermal Barrier
Coatings.*
AD-A174 784

*BEAMS(STRUCTURAL)

Estimation and Control of
Distributed Models for Certain
Elastic Systems Arising in Large
Space Structures.*
AD-A175 019

*BENDING

Estimation and Control of

Distributed Models for Certain
Elastic Systems Arising in Large
Space Structures.*
AD-A175 019

*BENZENE COMPOUNDS

Fuels Combustion Research.*
AD-A175 040

*BIFURCATION(MATHEMATICS)

Bifurcations into Pathology for
Hamiltonian Systems.*
AD-A174 781

*BIOASSAY

Variance Functions and the
Minimum Detectable Concentration in
Assays.*
AD-A174 983

*BIODETERIORATION

A Comparative Study Regarding
the Association of Alpha-2U
globulin with the Nephrotoxic
Mechanism of Certain Petroleum-
Based Air Force Fuels.*
AD-A175 104

*BIOSTATISTICS

Inference on the
Occurrence/Exposure Rate and Simple
Risk Rate.*
AD-A174 516
Tests Conditional on Imbalance
with Biased Coin Designs.*
AD-A174 777

*BIPOLAR TRANSISTORS

Development of a Planar
Heterojunction Bipolar Transistor
for Very High Speed Logic.*
AD-A174 580

*BISMUTH

Reprint: Relativistic
Calculation of Atomic N-Shell
Ionization by Protons.
AD-A174 846

*BORON

Fuels Combustion Research.*

SUBJECT INDEX-2
UNCLASSIFIED EVJ58L

APP-BOR

UNCLASSIFIED

AD-A175 040	*CARBON DISULFIDE Signal Processing with Degenerate Four-Wave Mixing.* AD-A174 427	Chemical Reactions in Turbulent Mixing Flows.* AD-A174 949
BORON OXIDES A Finite-Rate-Kinetics Model for Formation of Liquid Boron Oxide in a Nozzle Expansion Processes. AD-B107 982L	*CARBON MONOXIDE Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.* AD-A174 984	Carbon Monoxide and Turbulence- Chemistry Interactions Measurements and Modeling of Turbulent Jet Diffusion Flames.* AD-A174 951
BOUNDARY LAYER FLOW Asymptotic Solutions to Compressible Laminar Boundary-Layer Solutions for Dusty-Gas Flow over a Semi-Infinite Flat Plate. AD-A175 006	*CARBONYL COMPOUNDS The Spectroscopy and Reaction Kinetics of Coordinated Unsaturated Metal Carbonyls.* AD-A174 439	*CHLORINE Reprint: Combined Polynomial and Near-Dissociation Representations for Diatomic Spectral Data: C12(X) and I2(X). AD-A175 015
BOUNDARY LAYER TRANSITION An Interferometric Investigation of the Regular to Mach Reflection Transition Boundary in Pseudostationary Flow in Air. AD-A174 820	*CASCADE STRUCTURES Reprint: Stable and Efficient 2- D Lattice Filters. AD-A174 431	*CIRCUITS Theoretical Aspects of VLSI (very Large Scale Integration) Circuit Design.* AD-A175 051
BUBBLE MEMORIES Design and Fabrication of Submicron Magnetic Bubble Device Technology. AD-A174 821	*CERAMIC COATINGS A Fundamental Study of the Bonding of Thermal Barrier Coatings.* AD-A174 784	*CLONES Cloning of the poly(ADP-ribose) Gene from Rat Liver.* AD-A174 887
High Density Ion Implanted Contiguous Disk Bubble Technology.* AD-A174 898	*CERAMIC MATERIALS Ultra-Low Thermal Expansion Ceramics.* AD-A174 530	*CLUSTERING Reprint: System Structure Analysis: Clustering with Data Bindings. AD-A175 031
CADMIUM SELENIDES Signal Processing with Degenerate Four-Wave Mixing. AD-A174 427	*CERENKOV RADIATION High Power, Millimeter- Wavelength, Coherent Radiation Sources.* AD-A174 521	Reprint: Fifth-Order Many-Body Perturbation Theory and its Relationship to Various Coupled- Cluster Approaches. AD-A175 047
CADMIUM SULFIDES Signal Processing with Degenerate Four-Wave Mixing. AD-A174 427	*CHARGED PARTICLES Department of Defense Instrumentation Award.* AD-A174 868	*CODING Simply Instrumentable and Optimal Digitization of Analog Information Sources.* AD-A178 187
High Speed Low Power Nonlinear Optical Signal Processing.* AD-A174 492	*CHEMICAL LASERS Short Wavelength Chemical Laser (SWCL) Technology.* AD-C040 023	*CODING. *ASYNCHRONOUS SYSTEMS Asynchronous Discrete Control of Continuous Processes.* AD-A174 525
*CARBON Reprint: Isomers and Excitation Energies of C sub 4. AD-A174 801	*CHEMICAL REACTIONS	*COHERENT ELECTROMAGNETIC RADIATION High Power, Millimeter-
Plasma Deposition of Silicon Carbide Thin Films.* AD-A174 970		

SUBJECT INDEX-3
UNCLASSIFIED EVJ56L

BOR-CDH

UNCLASSIFIED

- Wavelength, Coherent Radiation Sources.*
AD-A174 521
- *COMBUSTION
 - Saturation and Spectral Line Behavior in the Resonant CARS Spectrum of OH.*
AD-A174 436
 - Combustion Kinetics of Metal Oxide and Halide Radicals and Metal Atoms.*
AD-A174 479
 - An Investigation of Flow Structure, Mixing and Chemical Reaction in Combusting Turbulent Flows.*
AD-A174 515
 - Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.*
AD-A174 520
 - Dense-Spray Structure and Phenomena.*
AD-A174 683
 - Numerical Experiments on Turbulent Mixing.*
AD-A174 763
 - Transport Phenomena and Interfacial Kinetics in Multiphase Combustion Systems.*
AD-A174 826
 - Carbon Monoxide and Turbulence-Chemistry Interactions Measurements and Modeling of Turbulent Jet Diffusion Flames.*
AD-A174 951
 - Numerical Simulation of Turbulent Flames Using Vortex Methods.*
AD-A174 967
 - Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.*
AD-A174 984
 - Fuels Combustion Research.*
AD-A175 040
 - Chemical Reactions in Turbulent Mixing Flows.*
AD-A175 071
- *COMBUSTION CHAMBERS
 - Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.*
AD-A174 984
- *COMBUSTION PRODUCTS
 - Transport Phenomena and Interfacial Kinetics in Multiphase Combustion Systems.*
AD-A174 826
 - A Finite-Rate-Kinetics Model for Formation of Liquid Boron Oxide in a Nozzle Expansion Processes.*
AD-8107 962L
- *COMBUSTION STABILITY
 - Mechanisms of Exciting Pressure Oscillations in Ramjet Engines.*
AD-A174 608
- *COMBUSTORS
 - Mechanisms of Exciting Pressure Oscillations in Ramjet Engines.*
AD-A174 608
- *COMMUNICABLE DISEASES
 - Inference on the Occurrence/Exposure Rate and Simple Risk Rate.*
AD-A174 516
- *COMMUNICATION AND RADIO SYSTEMS
 - Calculation of Cumulative Distributions and Detection Probabilities in Communications and Optics.*
AD-A175 082
- *COMMUNICATIONS NETWORKS
 - The Study of Certain Aspects of Probability with Applications in Communication Theory.*
AD-A174 919
 - Reprint: An Improved Algorithm for Performance Analysis of Networks with Unreliable Components.
AD-A176 263
- *COMPOSITE AIRCRAFT
 - Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.*
AD-A174 785
- *COMPOSITE MATERIALS
 - Damage Models for Delamination and Transverse Fracture in Fibrous Composites.*
AD-A174 661
- *COMPOSITE STRUCTURES
 - Thermoviscoelastic Characterization and Analysis of Fiber Composite Space Structures.*
AD-A175 024
- *COMPOSITE WINGS
 - Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.*
AD-A174 785
- *COMPRESSIBLE FLOW
 - Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.*
AD-A174 952
 - Computation of three Dimensional Viscous Compressible Flow at Hypersonic Velocity.*
AD-A174 968
- *COMPRESSOR BLADES
 - Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.*
AD-A175 090
 - Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.*
AD-A175 904
- *COMPUTATIONS
 - Parallel Optical Data Processing.*
AD-A174 853

SUBJECT INDEX-4
UNCLASSIFIED EVJ58L

COM-COM

UNCLASSIFIED

OCCAM First Quarterly Research
and Development Status Report: June-
August 1986.*
AD-A174 987
A Survey of Network Reliability
Modeling and Calculations.*
AD-A175 053

*COMPUTER AIDED DESIGN
Computer-Aided Structural Design
Optimization Using a Database
Management System.*
AD-A174 450
Nonlinear Analysis and Optimal
Design of Dynamic Mechanical
Systems for Spacecraft
Application.*
AD-A175 002

*COMPUTER AIDED MANUFACTURING
Center for Automation and
Manufacturing Science Established
at Stanford University.*
AD-A174 857

*COMPUTER ARCHITECTURE
Theoretical Aspects of VLSI
(Very Large Scale Integration)
Circuit Design.*
AD-A175 051
On the Analysis of Synchronous
Computing Arrays.*
AD-A175 055
Fast Algorithms for Structural
Analysis, Least Squares and Related
Computations.*
AD-A175 076

*COMPUTER PROGRAMMING
Fast Algorithms for Structural
Analysis, Least Squares and Related
Computations.*
AD-A175 078
A Deductive Approach to Computer
Programming.*
AD-A175 249

*COMPUTERS
Optical Symbolic Processor for
Expert System Execution.*
AD-A174 955

On the Analysis of Synchronous
Computing Arrays.*
AD-A175 055
Reprint: On Modelling the
Performance and Reliability of
Multimode Computer Systems.
AD-A176 193

*CONCENTRATION(CHEMISTRY)
Variance Functions and the
Minimum Detectable Concentration in
Assays.*
AD-A174 983

*CONCRETE
Constitutive Modelling of
Concrete and Rocks Under Multiaxial
Compressive Loadings.*
AD-A174 451

*CONTROL
Reprint: Feedback Stabilization
of State Delayed Systems via a
Reducing Transformation.
AD-A175 080

*CONTROL SYSTEMS
Reprint: Optimal Control of
Systems Possessing Symmetries.
AD-A174 702
Robust Control of Multivariable
and Large Scale Systems.*
AD-A175 058

*CONTROL THEORY
Asynchronous Discrete Control of
Continuous Processes.*
AD-A174 525
Reprint: Optimal Control of
Systems Possessing Symmetries.
AD-A174 702
The Control Theory of Flexible
and Articulated Spacecraft.*
AD-A174 880

*CONVERGENCE
The Study of Certain Aspects of
Probability with Applications in
Communication Theory.*
AD-A174 919

*CONVOLUTION
Optical Signal Processing Using
Non-Linear Optics.*
AD-A174 524

*CORRELATION TECHNIQUES
Correlation Length and its
Critical Exponents for Percolation
Processes.*
AD-A174 880

*CORRELATORS
Optical Signal Processing Using
Non-Linear Optics.*
AD-A174 524

*COST ANALYSIS
Replacement with Non-Constant
Operating Cost.*
AD-A175 034

*COVARIANCE
Robust Optimum Invariant Tests
of Covariance Structures Useful in
Linear Models.*
AD-A174 659
A Covariance Inequality for
Coherent Structures.*
AD-A174 889

*CROSSINGS
Reprint: A Stochastic
Characterization of the Sine
Function.
AD-A174 912

*CYTOPLASM
The Cytoskeleton: A Target for
Toxic Agents. Proceedings of the
Rochester International Conference
on Environmental Toxicity (18th)
Held in Rochester, New York on 4-8
June 1984.*
AD-A174 928

*DAMPING
Passively Damped Joints for
Advanced Space Structures.*
AD-A174 914
Optimal and Insensitive Control
of Hyperbolic Distributed Parameter

UNCLASSIFIED

- Systems with Applications to Wing Flutter Problems.*
AD-A174 954
- *DATA BASES
Computer-Aided Structural Design Optimization Using a Database Management System.*
AD-A174 450
A Database Management System for Engineering Applications.*
AD-A174 908
- *DATA REDUCTION
Reprint: A Note on Estimation with Quantized Data.
AD-A174 961
Analysis of MSS (Marine Seismic System) and OBS (Ocean Bottom Seismograph) Data Collected during the NGENDEL Seismic Experiment.*
AD-A174 754
- *DECISION THEORY
Reprint: Adaptive Control of Discounted Markov Decision Chains.
AD-A174 453
- *DEFECTS(MATERIALS)
Reprint: The Role of Surface Defects in Aluminum Surface Oxidation.
AD-A175 132
- *DELTA WINGS
Development of a Device for Controlling the Leading Edge Vortices on a Delta Wing.*
AD-A175 207
- *DESORPTION
Reprint: Energy- and Angle-Resolved Detection of Neutral Atoms Desorbed from Ion Bombarded Single Crystals. Rh(111) and Pt(2x2)O/Rh(111).
AD-A174 752
- *DETECTION
Electromagnetic Sensor Arrays for Nondestructive Evaluation and
- Robot Control.*
AD-A174 820
Reprint: Frequency Detection by Zero-Crossings.
AD-A174 930
High Density Ion Implanted Contiguous Disk Bubble Technology.*
AD-A174 989
Calculation of Cumulative Distributions and Detection Probabilities in Communications and Optics.*
AD-A175 082
- *DETECTORS
Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.*
AD-A174 820
Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.*
AD-A174 782
The Study of Certain Aspects of Probability with Applications in Communication Theory.*
AD-A174 919
- *DIATOMIC MOLECULES
Infrared-Laser Excitation of the Internal Vibrational Mode of a Diatomic Molecule Adsorbed on a Metal Surface.*
AD-A174 211
Reprint: Combined Polynomial and Near-Dissociation Representations for Diatomic Spectral Data: C12(X) and I2(X).
AD-A175 015
- *DIELECTRIC AMPLIFIERS
High Power, Millimeter-Wavelength, Coherent Radiation Sources.*
AD-A174 521
- *DIFFERENTIAL EQUATIONS
On First Passage Times and Differential Equations.*
AD-A174 848
Stochastic Evolution Equations
- With Values on the Dual of a Countably Hilbert Nuclear Space.*
AD-A174 876
- *DIGITAL FILTERS
Reprint: Digital Cauer-Type Ladders for Stable Filters.
AD-A174 800
- *DIMETHYLHYDRAZINES
Section-Dickson Model 420 Fluorescence-Activated Cell Sorter (FACS).
AD-A174 728
- *DISPERSION RELATIONS
Non-Orthogonal Designs for Measuring Dispersion.*
AD-A175 080
- *DISTORTION
Diffraction-Limited Imaging of Space Objects III.*
AD-A174 100
Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.*
AD-A175 080
- *DISTRIBUTED DATA PROCESSING
The Design and Implementation of a Network Computer.*
AD-A174 800
- *DUST
Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.*
AD-A174 952
- *DYNAMIC LOADS
Experimental and Theoretical Response of Multiphase Porous Media to Dynamic Loads.*
AD-A174 749
Motion and Stability of Saturated Soil Systems under Dynamic Loading.*
AD-A174 902

SUBJECT INDEX-6
UNCLASSIFIED EVJ58L

DAT-DYN

UNCLASSIFIED

*ECONOMIC MODELS
A Note on Merton's Optimum
Consumption and Portfolio Rules in
a Continuous-Time Model. Revised.*
AD-A175 008

*ELECTROCHEMISTRY
Investigation of Surface
Phenomena in Thermalionic Energy
Conversion.*
AD-A174 918

*ELECTRODES
Electromagnetic Sensor Arrays
for Nondestructive Evaluation and
Robot Control.*
AD-A174 820

*ELECTROMAGNETIC PUMPS
Department of Defense
Instrumentation Award.*
AD-A174 868

*ELECTROMAGNETIC WAVE FILTERS
Reprint: Stable and Efficient 2-
D Lattice Filters.
AD-A174 431

*ELECTRON BEAMS
High Power, Millimeter-
Wavelength, Coherent Radiation
Sources.*
AD-A174 521
Plasma Wave Turbulence and
Electromagnetic Radiation Caused by
Electron Beams.*
AD-A174 711

Interaction of Charged Particle
Beams with Pre-Ionized Channels.*
AD-A175 048

*ELECTRON MICROSCOPES
Acquisition of an Analytical
Electron Microscopy Facility.*
AD-A175 014

*ELECTRON SCATTERING
International Symposium on
Correlation and Polarization in
Electron-Atom Collisions Held in
Pasadena, California on 1-2 August

1985.*
AD-A174 882
Interaction of Charged Particle
Beams with Pre-Ionized Channels.*
AD-A175 048

*ELECTRON SPECTROSCOPY
The Gordon Research Conference
on Electron Spectroscopy Held in
Wolfeboro, New Hampshire on 14-18
July 1988.*
AD-A174 785

*ELECTRON TRANSFER
Electron Production, Electron
Attachment, and Charge
Recombination Process in High
Pressure Gas Discharges.*
AD-A175 011

*ELECTRONIC STATES
Reprint: Isomers of S1 C2: An
MBPT Study.
AD-A175 052

*ELECTRONS
Calculation of Cumulative
Distributions and Detection
Probabilities in Communications and
Optics.*
AD-A175 082

*ELECTROOPTICS
Thin-Film Optoelectronic
Circuits Research Program.*
AD-A174 572

*EMISSION SPECTRA
Reprint: Isomers and Excitation
Energies of C sub 4.
AD-A174 801
Two-Photon Detection Techniques
for Atomic Fluorine.*
AD-A174 948

*EMISSION SPECTROSCOPY
Two-Photon Detection Techniques
for Atomic Fluorine.*
AD-A174 948

*ENERGETIC PROPERTIES

Structure/Property/Reactivity
Relationships Among Nitramines and
Newer Energetic Materials.*
AD-A174 418

*ENERGY CONVERSION
Investigation of Surface
Phenomena in Thermalionic Energy
Conversion.*
AD-A174 918

*ENERGY TRANSFER
Plasma Wave Turbulence and
Electromagnetic Radiation Caused by
Electron Beams.*
AD-A174 711
Transport Phenomena and
Interfacial Kinetics in Multiphase
Combustion Systems.*
AD-A174 828

*ENZYMES
Cloning of the poly(ADP-ribose)
Gene from Rat Liver.*
AD-A174 687

*ERROR CORRECTION CODES
Reprint: A Theorem of I. Schur
and its Impact on Modern Signal
Processing.
AD-A174 881

*ESTIMATES
On the Mean Squared Error of
Nonparametric Quantile Estimators
under Random Right-Censorship.*
AD-A174 517
Reprint: A Note on Estimation
with Quantized Data.
AD-A174 581
Further Studies in Estimation of
Life Distribution Characteristics
from Censored Data.*
AD-A174 828

The Study of Certain Aspects of
Probability with Applications in
Communication Theory.*
AD-A174 918
Reprint: Frequency Detection by
Zero-Crossings.
AD-A174 930

SUBJECT INDEX-7
UNCLASSIFIED EVJ58L

ECO-EST

UNCLASSIFIED

The Effects of Variance Function Estimation on Prediction and Calibration: An Example.*
AD-A174 941

*EXCITONS

High Speed Low Power Nonlinear Optical Signal Processing.*
AD-A174 492

*EXPERIMENTAL DESIGN

A-Optimal Block Designs for Comparing Test Treatments with a Control.*
AD-A174 418

Design of Experiments and Reliability Models.*
AD-A174 736

Recent Discoveries on A-Optimal Designs for Comparing Test Treatments with Controls.*
AD-A174 948

Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.*
AD-A174 984

*EXPOSURE(PHYSIOLOGY)

Inference on the Occurrence/Exposure Rate and Simple Risk Rate.*
AD-A174 516

*EYE MOVEMENTS

Eye Movements and Visual Information Processing.*
AD-A176 162

*FACTORIAL DESIGN

Two New Series of Search Designs for 3(m) Factorial Experiments.*
AD-A174 429

Fractional Factorial Designs in the Form of Incomplete Orthogonal Arrays.*
AD-A174 568

*FAILURE(MECHANICS)

A Survey of Network Reliability Modeling and Calculations.*

AD-A178 063

*FATIGUE(MECHANICS)

Fundamental Studies in Fatigue and Fracture Mechanics. Phase I.*
AD-A174 483

Analytical and Experimental Characterization of Damage Processes in Composite Laminates.*
AD-A174 981

*FEEDBACK

Asynchronous Discrete Control of Continuous Processes.*
AD-A174 525

Reprint: Feedback Stabilization of State Delayed Systems via a Reducing Transformation.
AD-A178 080

*FIBER OPTICS

Optical Fibers for Nonlinear Optics.*
AD-A174 518

*FIBER REINFORCED COMPOSITES

Research on Characterization of Damage States in Continuous Fiber Composites Using Ultrasonic Nondesstructive Evaluation.*
AD-A175 004

Research on Damage Models for Continuous Fiber Composites.*
AD-A178 017

Thermoviscoelastic Characterization and Analysis of Fiber Composite Space Structures.*
AD-A175 024

*FIBERS

Damage Models for Delamination and Transverse Fracture in Fibrous Composites.*
AD-A174 661

The Cytoskeleton: A Target for Toxic Agents. Proceedings of the Rochester International Conference on Environmental Toxicity (16th) Held in Rochester, New York on 4-6 June 1984.*
AD-A174 928

*FINITE DIFFERENCE THEORY

Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.*
AD-A174 952

*FINITE ELEMENT ANALYSIS

Dynamic Analyses of Two-Dimensional Lattices.*
AD-A174 802

Models and Computational Methods for Dynamic Friction Phenomena. I. Physical Aspects of Dynamic Friction. II. Continuum Models and Variational Principles for Dynamic Friction. III. Finite Element Models and Numerical Analysis.*
AD-A174 917

Reprint: The p-Version of the Finite Element Method.
AD-A174 963

Nonlinear Analysis and Optimal Design of Dynamic Mechanical Systems for Spacecraft Application.*
AD-A175 002

*FLAME HOLDERS

Fuel Spray Ignition by Hot Surfaces and Stabilization of Aircraft Fires.*
AD-A174 852

*FLAME PROPAGATION

Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.*
AD-A174 520

Numerical Simulation of Turbulent Flames Using Vortex Methods.*
AD-A174 967

*FLAMES

An Investigation of Flow Structure, Mixing and Chemical Reaction in Combusting Turbulent Flows.*
AD-A174 515

SUBJECT INDEX-8
UNCLASSIFIED EVJ56L

EXC-FLA

UNCLASSIFIED

- *FLAT PLATE MODELS
Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.*
AD-A174 982
Asymptotic Solutions to Compressible Laminar Boundary-Layer Solutions for Dusty-Gas Flow over a Semi-Infinite Flat Plate.*
AD-A175 008
- *FLEXIBLE STRUCTURES
The Identification of a Distributed Parameter Model for a Flexible Structure.*
AD-A174 802
The Control Theory of Flexible and Articulated Spacecraft.*
AD-A174 880
- *FLOW SEPARATION
On the Prediction of Highly Vortical Flows Using an Euler Equation Model.*
AD-A174 831
Three-Dimensional Laminar Boundary Layers.*
AD-A175 010
Study of Separation and Vortices in Rotational Inviscid Flows.*
AD-A175 070
- *FLUORESCENCE
Reprint: Combined Polynomial and Near-Dissociation Representations for Diatomic Spectral Data: C12(X) and I2(X).
AD-A175 015
- *FLUORINE
Two-Photon Detection Techniques for Atomic Fluorine.*
AD-A174 848
- *FLUTTER
Optimal and Insensitive Control of Hyperbolic Distributed Parameter Systems with Applications to Wing Flutter Problems.*
AD-A174 854
- *FOUNDATIONS(STRUCTURES)
Three-Dimensional Finite Element Analysis of a Slab on Stress Dependent Elastic Solid Foundation.*
AD-A174 987
- *FRACTURE(MECHANICS)
Fundamental Studies in Fatigue and Fracture Mechanics. Phase 1.*
AD-A174 483
- *FREE ELECTRON LASERS
Department of Defense Instrumentation Award.*
AD-A174 886
- *FRICTION
Models and Computational Methods for Dynamic Friction Phenomena. I. Physical Aspects of Dynamic Friction. II. Continuum Models and Variational Principles for Dynamic Friction. III. Finite Element Models and Numerical Analysis.*
AD-A174 917
- *FUEL SPRAYS
Ignition of Fuel Sprays.*
AD-A174 888
- *FUNCTIONS(MATHEMATICS)
Confidence Bands under Proportional Hazards.*
AD-A174 523
- *GALLIUM ARSENIDES
Thin-Film Optoelectronic Circuits Research Program.*
AD-A174 572
Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic.*
AD-A174 580
Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.*
AD-A174 715
Investigation of Defect and Electronic Interactions Associated
- *GAS BEARINGS
Vibration Control in Rotating Machinery Using Variable Dynamic Stiffness Squeeze-Films. Volume 1.*
AD-A174 417
Vibration Control in Rotating Machinery Using Variable Dynamic Stiffness Squeeze Films. Volume 2.*
AD-A174 433
- *GAS DISCHARGES
Electron Production, Electron Attachment, and Charge Recombination Process in High Pressure Gas Discharges.*
AD-A175 011
- *GAS DYNAMICS
Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.*
AD-A174 958
Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.*
AD-A175 072
- *GAS FLOW
Chemical Reactions in Turbulent Mixing Flows.*
AD-A175 071
- *GAS TURBINES
Fluid Dynamic - Structural Interactions of Labyrinth Seals.*
AD-A174 481
- *GENES
Cloning of the poly(ADP-ribose) Gene from Rat Liver.*
AD-A174 887
- *GLASS
Optical Fibers for Nonlinear Optics.*
AD-A174 518
- *GRAPHS
- *With GaAs Device Processing.*
AD-A176 123

SUBJECT INDEX-5
UNCLASSIFIED EVJ56L

FLA-GRA

UNCLASSIFIED

- Optical Symbolic Processor for Expert System Execution.*
AD-A174 985
- *GROUND MOTION
An Application of Signal Analysis and Pattern Recognition to Study a Simple Ground Motion Problem.*
AD-A174 463
- *GROUP III COMPOUNDS
Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.*
AD-A176 123
- *GROUP V COMPOUNDS
Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.*
AD-A176 123
- *HALIDES
Combustion Kinetics of Metal Oxide and Halide Radicals and Metal Atoms.*
AD-A174 479
- *HEAT TRANSFER
Coherent Structure Modeling of Viscous Sublayer Turbulence for Incompressible Flow with Heat Transfer.*
AD-A175 194
- *HETEROJUNCTIONS
Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic.*
AD-A174 580
- *HIGH LEVEL LANGUAGE
The Design and Implementation of a Network Computer.*
AD-A174 800
- *HIGH STRENGTH ALLOYS
Stress Corrosion Cracking of Wrought and P/M High Strength Aluminum Alloys.*
- AD-A174 435
- *HIGH TEMPERATURE
Investigation and Synthesis of High Temperature and Increased Stiffness RSP Aluminum Alloys.*
AD-A174 598
- *HOLOGRAPHY
Optical Data Processing.*
AD-A174 465
- *HYDROCARBONS
Reprint: A Thermodynamic Study of Solutions of Liquid Hydrocarbon Mixtures in Water.
AD-A174 703
- *HYDROGEN FLUORIDE
Reprint: Hyperpolarizabilities of the Hydrogen Fluoride Molecule: A Discrepancy Between Theory and Experiment?
AD-A174 552
- *HYDROSTATIC PRESSURE
Vibration Control in Rotating Machinery Using Variable Dynamic Stiffness Squeeze-Films. Volume 1.*
AD-A174 417
- Vibration Control in Rotating Machinery Using Variable Dynamic Stiffness Squeeze Films. Volume 2.*
AD-A174 433
- *HYDROXYL RADICALS
Saturation and Spectral Line Behavior in the Resonant CARS Spectrum of OH.*
AD-A174 436
- *HYPERSONIC FLOW
Viscous Interactions at Hypersonic Speed.*
AD-A174 662
- *HYPERSONIC VELOCITY
Computation of three Dimensional Viscous Compressible Flow at Hypersonic Velocity.*
AD-A174 968
- *IGNITION
Fuel Spray Ignition by Hot Surfaces and Stabilization of Aircraft Fires.*
AD-A174 652
- Ignition of Fuel Sprays.*
AD-A174 598
- *IMAGE PROCESSING
Diffraction-Limited Imaging of Space Objects III.*
AD-A174 100
- *IMMUNOLOGY
Becton-Dickson Model 420 Fluorescence-Activated Cell Sorter (FACS).*
- AD-A174 728
- *IN VITRO ANALYSIS
Becton-Dickson Model 420 Fluorescence-Activated Cell Sorter (FACS).*
- AD-A174 728
- *INCOMPRESSIBLE FLOW
Coherent Structure Modeling of Viscous Sublayer Turbulence for Incompressible Flow with Heat Transfer.*
AD-A175 194
- *INFORMATION THEORY
Signal Processing with Degenerate Four-Wave Mixing.*
AD-A174 427
- The Study of Certain Aspects of Probability with Applications in Communication Theory.*
AD-A174 918
- *INFRARED SIGNATURES
Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.*
AD-A174 428
- *INFRARED SPECTROSCOPY
Structure/Property/Reactivity Relationships Among Nitramines and

SUBJECT INDEX-10
UNCLASSIFIED EVJ56L

GRO-INF

UNCLASSIFIED

Newer Energetic Materials.*
AD-A174 418
The Spectroscopy and Reaction
Kinetics of Coordinated Unsaturated
Metal Carbonyls.*
AD-A174 438

*INTEGRATED CIRCUITS
Thin-Film Optoelectronic
Circuits Research Program.*
AD-A174 572

*INTEGRATION
Theoretical Aspects of VLSI
(Very Large Scale Integration)
Circuit Design.*
AD-A175 051

*INTERNAL FRICTION
Analysis of Three-Dimensional
Viscous Internal Flows.*
AD-A174 497

*INVARIANCE
On the Existence and Uniqueness
of Invariant Measure for Continuous
Time Markov Processes.*
AD-A174 788

*INVERSE SCATTERING
Reprint: A Theorem of I. Schur
and its Impact on Modern Signal
Processing.
AD-A174 881

*INVERSION
A Comparison of Stability and
Convergence Properties of
Techniques for Inverse Problems.*
AD-A174 733

*INVISCID FLOW
Three-Dimensional Viscous Flow
Solutions with a Vorticity - Stream
Function Formulation.*
AD-A175 058
Study of Separation and Vortices
in Rotational Inviscid Flows.*
AD-A175 070

*IODINE

Reprint: Combined Polynomial and
Near-Dissociation Representations
for Diatomic Spectral Data: C12(X)
and I2(X).
AD-A175 015

*ION BOMBARDMENT
Reprint: Energy- and Angle-
Resolved Detection of Neutral Atoms
Desorbed from Ion Bombarded Single
Crystals. Rh(111) and
P(2x2)O/Rh(111).
AD-A174 752

*ION IMPLANTATION
Design and Fabrication of
Submicron Magnetic Bubble Device
Technology.*
AD-A174 821

*IONS
High Density Ion Implanted
Contiguous Disk Bubble Technology.*
AD-A174 938

*ITERATIONS
Numerical Analysis.*
AD-A174 936

*JET ENGINE FUELS
A Study of the Toxicity of the
Metabolites of the Cruise Missile
Fuel JP-10 on Several Animal
Species.*
AD-A174 750

*JET FLAMES
Carbon Monoxide and Turbulence-
Chemistry Interactions Measurements
and Modeling of Turbulent Jet
Diffusion Flames.*
AD-A174 951

*JET FLOW
Fundamental Study of Jet Flows.*
AD-A174 751

*JOINTS
Constitutive Modeling of
Concrete and Rocks Under Multiaxial
Compressive Loadings.*

AD-A174 451
Passively Damped Joints for
Advanced Space Structures.*
AD-A174 914

*KIDNEYS
A Cooperative Study Regarding
the Association of Alpha-2U
globulin with the Nephrotoxic
Mechanism of Certain Petroleum-
Based Air Force Fuels.*
AD-A175 104

*LAMINAR BOUNDARY LAYER
Finite-Difference Solutions for
Compressible Laminar Boundary-Layer
Flows of a Dusty Gas over a Semi-
Infinite Flat Plate.*
AD-A174 982
Three-Dimensional Laminar
Boundary Layers.*
AD-A175 010

*LAMINATES
Analytical and Experimental
Characterization of Damage
Processes in Composite Laminates.*
AD-A174 991
Research on Damage Models for
Continuous Fiber Composites.*
AD-A175 017

*LASER APPLICATIONS
Support of the International
Laser Science Conference (1st) Held
in Dallas, Texas on 18-22 November
1985.*
AD-A174 768

*LASER COMPONENTS
Adaptive Grid Generation.*
AD-A174 942
Optically Pumped Short
Wavelength Lasers.*
AD-A174 985

*LASER INDUCED FLUORESCENCE
Theory of Laser-Induced
Phenomena on Conventional and Phase-
Conjugated Surfaces.*
AD-A174 484

SUBJECT INDEX-11
UNCLASSIFIED EVJ56L

INT-LAS

UNCLASSIFIED

- *LASER PUMPING
Infrared-Laser Excitation of the
Internal Vibrational Mode of a
Diatomic Molecule Adsorbed on a
Metal Surface.*
AD-A174 211
- Theory of Laser-Induced
Phenomena on Conventional and Phase-
Conjugated Surfaces.*
AD-A174 484
- The Gordon Research Conference
on Multiphoton Processes Held in
New London, New Hampshire on 9-13
June 1988.*
AD-A174 784
- *LASER TARGET INTERACTIONS
Research on Certain Aspects of
Laser Diffraction Particle Size
Analysis Relevant to Autonomous
Self-Diagnosing Instrumentation.*
AD-A174 428
- The Role of the Plasma during
Laser-Gas Laser-Metal
Interactions.*
AD-A174 578
- *LEADING EDGES
Development of a Device for
Controlling the Leading Edge
Vortices on a Delta Wing.*
AD-A178 207
- *LEARNING
OCCAM First Quarterly Research
and Development Status Report: June-
August 1988.*
AD-A174 957
- *LEAST SQUARES METHOD
Variance Functions and the
Minimum Detectable Concentration in
Assays.*
AD-A174 983
- *LIFE EXPECTANCY(SERVICE LIFE)
Markovian Shock Models,
Deterioration Processes, Stratified
Markov Processes Replacement
Policies.*
AD-A174 848
- *LINEAR FILTERING
Reprint: Frequency Detection by
Zero-Crossings.
AD-A174 930
- *LINEARITY
Approximate and Local
Linearizability of Nonlinear
Discrete-Time Systems.*
AD-A174 823
- *LIQUEFACTION
Mechanical Behavior of Saturated
Soils - A Review.*
AD-A174 895
- Motion and Stability of
Saturated Soil Systems under
Dynamic Loading.*
AD-A174 902
- *LIVER
Cloning of the poly(ADP-ribose)
Gene from Rat Liver.*
AD-A174 887
- *LOGIC
OCCAM First Quarterly Research
and Development Status Report: June-
August 1988.*
AD-A174 957
- *LOGIC CIRCUITS
Development of a Planar
Heterojunction Bipolar Transistor
for Very High Speed Logic.*
AD-A174 880
- *LOOPS
Electromagnetic Sensor Arrays
for Nondestructive Evaluation and
Robot Control.*
AD-A174 782
- *LOW PASS FILTERS
Reprint: Digital Cauer-Type
Ladders for Stable Filters.
AD-A174 800
- *LYMPHOCTES
Becton-Dickson Model 420
Fluorescence-Activated Cell Sorter
- (FACS).*
- AD-A174 728
- *MAGNESIUM ALLOYS
Al and Mg Alloys for Aerospace
Applications Using Rapid
Solidification and Powder
Metallurgy Processing.*
AD-A178 030
- *MAGNETIC ALLOYS
Fabrication of Material and
Devices for Very High Density
Information Storage.*
AD-A174 548
- *MAGNETIC DISKS
High Density Ion Implanted
Contiguous Disk Bubble Technology.*
AD-A174 988
- *MAGNETIC FILM MEMORIES
Fabrication of Material and
Devices for Very High Density
Information Storage.*
AD-A174 548
- *MAGNETOSPHERE
The Analysis Phase of MITHRAS.*
AD-A174 803
- *MANIPULATORS
Center for Automation and
Manufacturing Science Established
at Stanford University.*
AD-A174 857
- *MAPPING(TRANSFORMATIONS)
Continuum Structure Functions.*
AD-A175 005
- *MARINE GEOPHYSICS
Analysis of MSS (Marine Seismic
System) and OBS (Ocean Bottom
Seismograph) Data Collected during
the NGENDEI Seismic Experiment.*
AD-A174 754
- *MARKOV PROCESSES
Reprint: Adaptive Control of
Discounted Markov Decision Chains.

SUBJECT INDEX-12
UNCLASSIFIED EVJ56L

LAS-MAR

UNCLASSIFIED

AD-A174 483
On the Existence and Uniqueness
of Invariant Measure for Continuous
Time Markov Processes.*
AD-A174 788
Tests Conditional on Imbalance
with Biased Coin Designs.*
AD-A174 777
Markovian Shock Models.
Deterioration Processes, Stratified
Markov Processes and Replacement
Policies.*
AD-A174 886
Reprint: Analysis of an
Identification Algorithm Arising in
the Adaptive Estimation of Markov
Chains.
AD-A175 081

*MASERS
High Power, Millimeter-
Wavelength, Coherent Radiation
Sources.*
AD-A174 821

*MATCHING
Electromagnetic Sensor Arrays
for Nondestructive Evaluation and
Robot Control.*
AD-A174 820
*MATHEMATICAL FILTERS
Some Recent Results in Nonlinear
Filtering Theory with Finitely
Additive White Noise.*
AD-A174 878

*MATHEMATICAL MODELS
Reprint: Stable and Efficient 2-
D Lattice Filters.
AD-A174 431
Confidence Bands under
Proportional Hazards.*
AD-A174 523
Adapting for Heteroscedasticity
in Regression Models.*
AD-A174 584
Markovian Shock Models.
Deterioration Processes, Stratified
Markov Processes Replacement
Policies.*

AD-A174 848
Reprint: Covariate Measurement
Error in Logistic Regression.
AD-A174 743
Reliability of Complex Devices
in Random Environments.*
AD-A174 883
Lumped Model Generation and
Evaluation: Sensitivity and Lie
Algebraic Techniques with
Applications to Combustion.*
AD-A174 884
A Note on Merton's Optimum
Consumption and Portfolio Rules in
a Continuous-Time Model. Revised.*
AD-A175 008
Reprint: On Stationarity of the
Solution of a Doubly Stochastic
Model.
AD-A175 035

*MEDIA
Department of Defense
Instrumentation Award.*
AD-A174 866

*MEMORY DEVICES
Fabrication of Material and
Devices for Very High Density
Information Storage.*
AD-A174 548
Optical Symbolic Processor for
Expert System Execution.*
AD-A174 955
High Density Ion Implanted
Continuous Disk Bubble Technology.*
AD-A174 999

*METABOLITES
A Study of the Toxicity of the
Metabolites of the Cruise Missile
Fuel JP-10 on Several Animal
Species.*
AD-A174 750

*METAL COATINGS
A Fundamental Study of the
Bonding of Thermal Barrier
Coatings.*
AD-A174 784

*METAL COMPOUNDS
The Spectroscopy and Reaction
Kinetics of Coordinated Unsaturated
Metal Carbonyls.*
AD-A174 439
Combustion Kinetics of Metal
Oxide and Halide Radicals and Metal
Atoms.*
AD-A174 479

*METAL MATRIX COMPOSITES
Analytical and Experimental
Characterization of Damage
Processes in Composite Laminates.*
AD-A174 991
Micro-Mechanisms of Deformation
in SiC/Al Composites.*
AD-B107 788

*MICROWAVES
Plasma Wave Turbulence and
Electromagnetic Radiation Caused by
Electron Beams.*
AD-A174 711

*MILITARY SATELLITES
Dynamic Analyses of Two-
Dimensional Lattices.*
AD-A174 602
Local-Global Interactions in the
Transient Response of Lattice-Truss
Plates.*
AD-A174 688

*MILLING MACHINES
DoD-University Research
Instrumentation Program.*
AD-A174 915

*MIXING
Signal Processing with
Degenerate Four-Wave Mixing.*
AD-A174 427
High Speed Low Power Nonlinear
Optical Signal Processing.*
AD-A174 492
Numerical Experiments on
Turbulent Mixing.*
AD-A174 783

*MODELS

SUBJECT INDEX-13
UNCLASSIFIED EVJ58L

MAS-MOD

UNCLASSIFIED

A Survey of Network Reliability Modeling and Calculations.*
AD-A175 083

*MOLECULAR ISOMERISM
Reprint: Isomers and Excitation Energies of C sub 4.
AD-A174 801

*MOLECULAR VIBRATION
Infrared-Laser Excitation of the Internal Vibrational Mode of a Diatomic Molecule Adsorbed on a Metal Surface.*
AD-A174 211

*MONOXIDES
Combustion Kinetics of Metal Oxide and Halide Radicals and Metal Atoms.*
AD-A174 479

*MOSFET SEMICONDUCTORS
Design and Fabrication of Submicron Magnetic Bubble Device Technology.*
AD-A174 821

*MULTIMODE
Reprint: On Modelling the Performance and Reliability of Multimode Computer Systems.
AD-A176 193

*MULTIPROCESSORS
Sparse Elimination on Vector Multiprocessors.*
AD-A175 121

*MULTIVARIATE ANALYSIS
Reprint: Optimal Bandwidth Selection in Nonparametric Regression Function Estimation.
AD-A174 537
Robust Control of Multivariable and Large Scale Systems.*
AD-A175 056
Multivariable Problems of Statistical and Probability Theory.*
AD-A175 284

*N BODY PROBLEM

Reprint: Fifth-Order Many-Body Perturbation Theory and its Relationship to Various Coupled-Cluster Approaches.
AD-A175 047

*N TYPE SEMICONDUCTORS
Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic.*
AD-A174 580

*NETWORK ANALYSIS(MANAGEMENT)
Algebraic and Computational Aspects of Network Reliability and Problems.*
AD-A175 076

Reprint: An Improved Algorithm for Performance Analysis of Networks with Unreliable Components.
AD-A176 283

*NEUTRINOS
Analytical/Experimental Investigation of Corpuscular Radiation Detectors.*
AD-B108 383

*NITRAMINES
Structure/Property/Reactivity Relationships Among Nitramines and Newer Energetic Materials.*
AD-A174 419

*NOISE(ELECTRICAL AND ELECTROMAGNETIC)
Fundamental Quantum 1/F Noise in Ultrasmall Semi Conductor Devices and Their Optimal Design Principles.*
AD-A174 512

*NONDESTRUCTIVE TESTING
Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.*
AD-A174 820
Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.*

AD-A174 792

*NONEQUILIBRIUM FLOW
Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.*
AD-A174 952

*NONLINEAR ANALYSIS
Nonlinear Analysis and Optimal Design of Dynamic Mechanical Systems for Spacecraft Application.*
AD-A175 002

*NONLINEAR PROPAGATION ANALYSIS
Nonlinear Wave Propagation.*
AD-A175 073

*NONLINEAR SYSTEMS
High Speed Low Power Nonlinear Optical Signal Processing.*
AD-A174 492
Optical Fibers for Nonlinear Optics.*
AD-A174 518

Optical Signal Processing Using Non-Linear Optics.*

AD-A174 524
Approximate and Local Linearizability of Nonlinear Discrete-Time Systems.*
AD-A174 823

Parallel Optical Data Processing.*

AD-A174 853
Some Recent Results in Nonlinear Filtering Theory with Finitely Additive White Noise.*

AD-A174 878
Study of Infrared Nonlinear Processes in Semiconductors.*
AD-A174 921

*NONPARAMETRIC STATISTICS
On the Mean Squared Error of Nonparametric Quantile Estimators under Random Right-Censorship.*
AD-A174 517
Further Studies in Estimation of

SUBJECT INDEX-14
UNCLASSIFIED EVJ56L

MDL-NON

UNCLASSIFIED

Life Distribution Characteristics
from Censored Data.*
AD-A174 829

*NUCLEAR SHELL MODELS

Reprint: Relativistic
Calculation of Atomic N-Shell
Ionization by Protons.
AD-A174 848

*NUMERICAL ANALYSIS

Numerical Analysis.*
AD-A174 938

*NUMERICAL METHODS AND PROCEDURES

Calculation of Cumulative
Distributions and Detection
Probabilities in Communications and
Optics.*
AD-A175 082

*OPERATIONS RESEARCH

Controller Synthesis for
Distributed Parameter Systems.*
AD-A174 886

*OPTICAL CIRCUITS

Optical Computing Strategies.*
AD-A175 018

*OPTICAL DATA

Parallel Optical Data
Processing.*
AD-A174 853

*OPTICAL IMAGES

Structure from Motion.*
AD-A175 089

*OPTICAL PROCESSING

Optical Data Processing.*
AD-A174 485
High Speed Low Power Nonlinear
Optical Signal Processing.*
AD-A174 492
Optical Signal Processing Using
Non-Linear Optics.*
AD-A174 524
Parallel Optical Data
Processing.*
AD-A174 853

Optical Symbolic Processor for
Expert System Execution.*
AD-A174 988

OCCAM First Quarterly Research
and Development Status Report: June-
August 1988.*
AD-A174 957

Optical Computing Strategies.*
AD-A175 018

Structure from Motion.*
AD-A175 089

*OPTICAL SWITCHING

High Speed Low Power Nonlinear
Optical Signal Processing.*
AD-A174 492

*OXIDATION

Combustion Kinetics of Metal
Oxide and Halide Radicals and Metal
Atoms.*
AD-A174 479

Reprint: The Effects of Surface
Facets on the Oxidation of Aluminum
(111) Surfaces.
AD-A175 131

Reprint: The Role of Surface
Defects in Aluminum Surface
Oxidation.
AD-A175 132

*PALEONTOLOGY

Are Mass Extinctions Really
Periodic?*

AD-A174 290

*PARALLEL PROCESSING

Parallel Optical Data
Processing.*
AD-A174 853

*PARAMETRIC ANALYSIS

Controller Synthesis for
Distributed Parameter Systems.*
AD-A174 886

*PARTICLE BEAMS

Department of Defense
Instrumentation Award.*
AD-A174 868

*PARTICLE COLLISIONS

International Symposium on
Correlation and Polarization in
Electron-Atom Collisions Held in
Pasadena, California on 1-2 August
1988.*
AD-A174 992

*PARTICULATES

Research on Certain Aspects of
Laser Diffraction Particle Size
Analysis Relevant to Autonomous
Self-Diagnosing Instrumentation.*
AD-A174 428

*PARTS

Reliability of Complex Devices
in Random Environments.*
AD-A174 953

*PATTERN RECOGNITION

An Application of Signal
Analysis and Pattern Recognition to
Study a Simple Ground Motion
Problem.*
AD-A174 483
Optical Data Processing.*
AD-A174 485

*PAVEMENTS

Three-Dimensional Finite Element
Analysis of a Slab on Stress
Dependent Elastic Solid
Foundation.*
AD-A174 987

*PERCOLATION

Correlation Length and its
Critical Exponents for Percolation
Processes.*
AD-A174 860

*PERTURBATION THEORY

Reprint: Fifth-Order Many-Body
Perturbation Theory and its
Relationship to Various Coupled-
Cluster Approaches.
AD-A175 047

*PHASE STUDIES

The Air Force Office of

SUBJECT INDEX-15
UNCLASSIFIED EVJ58L

NUC-PHA

UNCLASSIFIED

Scientific Research for Low-Frequency Acoustic Microscope.*
AD-A174 480

*PHASE TRANSFORMATIONS
Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.*
AD-A174 532

*PHOTODISSOCIATION
The Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 9-13 June 1988.*
AD-A174 764
Reprint: Combined Polynomial and Near-Dissociation Representations for Diatomic Spectral Data: C12(X) and I2(X).
AD-A175 015

*PIEZOELECTRIC MATERIALS
Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.*
AD-A174 715

*PITCH(MOTION)
Dynamic Stall Penetration Experiments on a Swept Wing.*
AD-A174 962

*PLASMAS(PHYSICS)
The Role of the Plasma during Laser-Gas Laser-Metal Interactions.*
AD-A174 579
Plasma Wave Turbulence and Electromagnetic Radiation Caused by Electron Beams.*
AD-A174 711
Plasma Deposition of Silicon Carbide Thin Films.*
AD-A174 970
Nonlinear Wave Propagation.*
AD-A175 073

*POINTS(MATHEMATICS)
On the Theory of Conditioning in

Point Processes.*
AD-A174 500

*POLARIZATION
Reprint: Hyperpolarizabilities of the Hydrogen Fluoride Molecule: A Discrepancy Between Theory and Experiment?
AD-A174 552

*POLYMERS
Analytical and Experimental Characterization of Damage Processes in Composite Laminates.*
AD-A174 991

*POROUS MATERIALS
Experimental and Theoretical Response of Multiphase Porous Media to Dynamic Loads.*
AD-A174 749

*POWDER METALLURGY
Rapid Solidification Processing and Powder Metallurgy of Al Alloys.*
AD-A174 553

*PRANDTL NUMBER
Coherent Structure Modeling of Viscous Sublayer Turbulence for Incompressible Flow with Heat Transfer.*
AD-A175 194

*PREDICTIONS
Summary of Accomplished Work under the Air Force Grant AFOSR-83-0229.*
AD-A174 938

*PROBABILITY
The Study of Certain Aspects of Probability with Applications in Communication Theory.*
AD-A174 919

*PROBABILITY DENSITY FUNCTIONS
On the First Passage Times of Pure Jump Processes.*
AD-A174 534

*PROBABILITY DISTRIBUTION FUNCTIONS
On the Mean Squared Error of Nonparametric Quantile Estimators under Random Right-Censorship.*
AD-A174 917

*PROBLEM SOLVING
Research on Problem-Solving Systems.*
AD-A174 940

*PROCESSING EQUIPMENT
Optical Data Processing.*
AD-A174 485
Optical Signal Processing Using Non-Linear Optics.*
AD-A174 524

*PROGRAMMING LANGUAGES
Optical Symbolic Processor for Expert System Execution.*
AD-A174 955

*PROPAGATION
Department of Defense Instrumentation Award.*
AD-A174 886

*PROTEINS
The Cytoskeleton: A Target for Toxic Agents. Proceedings of the Rochester International Conference on Environmental Toxicity (18th) Held in Rochester, New York on 4-6 June 1984.*
AD-A174 928

*PSYCHOPHYSICS
Visual Temporal Filtering and Intermittent Visual Displays.*
AD-A174 773

*PYROLYSIS
Structure/Property/Reactivity Relationships Among Nitramines and Newer Energetic Materials.*
AD-A174 419

*QUALITY CONTROL
Variance Function Estimation.*
AD-A174 981

SUBJECT INDEX-18
UNCLASSIFIED EVJ56L

PHA-QUA

UNCLASSIFIED

- *QUANTIZATION
Reprint: A Note on Estimation
with Quantized Data.
AD-A174 561
The Study of Certain Aspects of
Probability with Applications in
Communication Theory.*
AD-A174 919
- *QUANTUM ELECTRONICS
Joint Services Electronics
Program.*
AD-A174 318
Fundamental Quantum 1/F Noise in
Ultrasmall Semi Conductor Devices
and Their Optimal Design
Principles.*
AD-A174 512
- *QUEUEING THEORY
Reprint: A Single Server Queue
in a Hard-Real-Time Environment.
AD-A174 604
- *RADAR
The Analysis Phase of MITHRAS.*
AD-A174 803
- *RADIATION MEASURING INSTRUMENTS
Analytical/Experimental
Investigation of Corpuscular
Radiation Detectors.*
AD-B108 363
- *RAMAN SPECTROSCOPY
Saturation and Spectral Line
Behavior in the Resonant CARS
spectrum of OH.*
AD-A174 436
- *RAMJET ENGINES
Mechanisms of Exciting Pressure
Oscillations in Ramjet Engines.*
AD-A174 608
- *RANK ORDER STATISTICS
Calculation of Cumulative
Distributions and Detection
Probabilities in Communications and
Optics.*
AD-A175 082
- *REACTION KINETICS
The Spectroscopy and Reaction
Kinetics of Coordinated Unsaturated
Metal Carbonyls.*
AD-A174 439
A Finite-Rate-Kinetics Model for
Formation of Liquid Boron Oxide in
a Nozzle Expansion Processes.*
AD-B107 962L
- *REAL TIME
Reprint: A Single Server Queue
in a Hard-Real-Time Environment.
AD-A174 604
- *RECOMBINATION REACTIONS
Electron Production, Electron
Attachment, and Charge
Recombination Process in High
Pressure Gas Discharges.*
AD-A175 011
- *RECTIFIERS
Calculation of Cumulative
Distributions and Detection
Probabilities in Communications and
Optics.*
AD-A175 082
- *RECURSIVE FUNCTIONS
Tests Conditional on Imbalance
with Biased Coin Designs.*
AD-A174 777
- *REFLECTION
An Interferometric Investigation
of the Regular to Mach Reflection
Transition Boundary in
Pseudostationary Flow in Air.*
AD-A174 820
- *REGRESSION ANALYSIS
Reprint: Optimal Bandwidth
Selection in Nonparametric
Regression Function Estimation.
AD-A174 537
Reprint: Dynamic Realizations of
Sufficient Sequences.
AD-A174 538
Adapting for Heteroscedasticity
in Regression Models.*
- AD-A174 584
Reprint: Covariate Measurement
Error in Logistic Regression.
AD-A174 743
Variance Function Estimation.*
AD-A174 981
Variance Functions and the
Minimum Detectable Concentration in
Assays.*
AD-A174 983
- *RELIABILITY
Reprint: Distributions with
Monotone Failure Rate.
AD-A174 573
Design of Experiments and
Reliability Models.*
AD-A174 736
Effects of Assuming Independent
Component Failure Times, If They
Are Actually Dependent, in a Series
System.*
AD-A174 825
A Covariance Inequality for
Coherent Structures.*
AD-A174 889
Reliability of Complex Devices
in Random Environments.*
AD-A174 953
Continuum Structure Functions.*
AD-A175 005
A Survey of Network Reliability
Modeling and Calculations.*
AD-A175 053
Reliability Modeling and
Inference for Coherent Systems
Subject to Aging Shock and Repair.*
AD-A175 376
- *REMOTE DETECTORS
Two-Photon Detection Techniques
for Atomic Fluorine.*
AD-A174 946
- *RESONATORS
Analytical Investigations of
Bulk Wave Resonators in the
Piezoelectric Thin Film on Gallium-
Arsenide Configuration.*
AD-A174 715

UNCLASSIFIED EVJ56L
SUBJECT INDEX-17

QUA-RES

UNCLASSIFIED

- *RHENIUM
Reprint: Energy- and Angle-Resolved Detection of Neutral Atoms Desorbed from Ion Bombarded Single Crystals. Rh(111) and p(2x2)O/Rh(111).
AD-A174 752
- *RISK
Inference on the Occurrence/Exposure Rate and Simple Risk Rate.*
AD-A174 516
- *ROBOTICS
Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.*
AD-A174 792
- *ROCK MECHANICS
Constitutive Modeling of Concrete and Rocks Under Multiaxial Compressive Loadings.*
AD-A174 451
- *ROTARY SEALS
Fluid Dynamic - Structural Interactions of Labyrinth Seals.*
AD-A174 461
- *ROTATION
The Control Theory of Flexible and Articulated Spacecraft.*
AD-A174 880
- *RUNWAYS
Three-Dimensional Finite Element Analysis of a Slab on Stress Dependent Elastic Solid Foundation.*
AD-A174 987
- *SAMPLING
Reprint: Digital Cauer-Type Ladders for Stable Filters.
AD-A174 800
- *SAND
A Self Consistent Estimate of the Elastic Constants of a Random Array of Equal Spheres with Application to Granular Soil under Isotropic Conditions.*
AD-A174 442
- *SATURATION
Saturation and Spectral Line Behavior in the Resonant CARS spectrum of OH.*
AD-A174 438
- Mechanical Behavior of Saturated Soils - A Review.*
AD-A174 895
- *SCIENTIFIC SATELLITES
Estimation and Control of Distributed Models for Certain Elastic Systems Arising in Large Space Structures.*
AD-A175 019
- *SEALS(STOPPERS)
Fluid Dynamic - Structural Interactions of Labyrinth Seals.*
AD-A174 780
- *SEISMIC DATA
Analysis of MSS (Marine Seismic System) and OBS (Ocean Bottom Seismograph) Data Collected during the NGENDEI Seismic Experiment.*
AD-A174 754
- *SEISMIC WAVES
An Application of Signal Analysis and Pattern Recognition to Study a Simple Ground Motion Problem.*
AD-A174 463
- *SEMICONDUCTORS
High Speed Low Power Nonlinear Optical Signal Processing.*
AD-A174 492
- Fundamental Quantum 1/F Noise in Ultrasmall Semi Conductor Devices and Their Optimal Design Principles.*
AD-A174 512
- Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.*
AD-A174 715
- Study of Infrared Nonlinear Processes in Semiconductors.*
AD-A174 921
- *SEQUENCES(MATHEMATICS)
Reprint: Dynamic Realizations of Sufficient Sequences.
AD-A174 538
- *SEQUENTIAL ANALYSIS
Non-Orthogonal Designs for Measuring Dispersion.*
AD-A175 080
- *SHOCK WAVES
An Interferometric Investigation of the Regular to Mach Reflection Transition Boundary in Pseudostationary Flow in Air.*
AD-A174 820
- Computation of three Dimensional Viscous Compressible Flow at Hypersonic Velocity.*
AD-A174 988
- The Study of Shock Wave and Turbulent Boundary Layer Interactions.*
AD-A175 033
- *SHORT TAKEOFF AIRCRAFT
Experiments in an Adaptable-Wall Wind Tunnel for V/STOL Testing.*
AD-A174 900
- *SIGNAL PROCESSING
Optical Signal Processing Using Non-Linear Optics.*
AD-A174 524
- Reprint: A Theorem of I. Schur and its Impact on Modern Signal Processing.
AD-A174 881
- The Study of Certain Aspects of Probability with Applications in Communication Theory.*
AD-A174 819
- Study of Infrared Nonlinear Processes in Semiconductors.*

SUBJECT INDEX-18
UNCLASSIFIED EVJ58L

RHE-SIG

UNCLASSIFIED

AD-A174 921
*SIGNALS
Reprint: A Stochastic
Characterization of the Sine
Function.
AD-A174 912
Reprint: Frequency Detection by
Zero-Crossings.
AD-A174 930

*SIGNATURES
Reprint: A Stochastic
Characterization of the Sine
Function.
AD-A174 912

*SILICON
Thin-Film Optoelectronic
Circuits Research Program.*
AD-A174 872
Design and Fabrication of
Submicron Magnetic Bubble Device
Technology.*
AD-A174 821

*SILICON CARBIDES
Plasma Deposition of Silicon
Carbide Thin Films.*
AD-A174 970
Reprint: Isomers of Si C2: An
MBPT Study.
AD-A175 052
Micro-Mechanisms of Deformation
in SiC/Al Composites.*
AD-8107 755

*SINE WAVES
Reprint: A Stochastic
Characterization of the Sine
Function.
AD-A174 912

*SINGLE CRYSTALS
Optical Fibers for Nonlinear
Optics.*
AD-A174 818
Reprint: Energy- and Angle-
Resolved Detection of Neutral Atoms
Desorbed from Ion Bombarded Single
Crystals. Rh(111) and

P(2x2)O/Rh(111).
AD-A174 752

*SLIDING FRICTION
Computational Methods for
Nonlinear Dynamics Problems in
Solid and Structural Mechanics:
Models of Dynamic Frictional
Phenomena in Metallic Structures.*
AD-A174 585
Models and Computational Methods
for Dynamic Friction Phenomena. I.
Physical Aspects of Dynamic
Friction. II. Continuum Models and
Variational Principles for Dynamic
Friction. III. Finite Element
Models and Numerical Analysis.*
AD-A174 917

*SLURRY FUELS
Fuels Combustion Research.*
AD-A175 040

*SOIL DYNAMICS
Variational Principles for
Dynamics of Linear Elastic Fluid-
Saturated Soils.*
AD-A175 020

*SOIL MECHANICS
A Self Consistent Estimate of
the Elastic Constants of a Random
Array of Equal Spheres with
Application to Granular Soil under
Isotropic Conditions.*
AD-A174 442
Three-Dimensional Elasto-Plastic
Analysis for Soils.*
AD-A174 583
Experimental and Theoretical
Response of Multiphase Porous Media
to Dynamic Loads.*
AD-A174 749
Mechanical Behavior of Saturated
Soils - A Review.*
AD-A174 895
Motion and Stability of
Saturated Soil Systems under
Dynamic Loading.*
AD-A174 902

*SOIL MODELS
A Self Consistent Estimate of
the Elastic Constants of a Random
Array of Equal Spheres with
Application to Granular Soil under
Isotropic Conditions.*
AD-A174 442
Three-Dimensional Elasto-Plastic
Analysis for Soils.*
AD-A174 583

*SOLID STATE ELECTRONICS
Joint Services Electronics
Program.*
AD-A174 318

*SOLIDIFICATION
Rapid Solidification Processing
and Powder Metallurgy of Al
Alloys.*
AD-A174 553

*SOLUTIONS(MIXTURES)
Reprint: A Thermodynamic Study
of Solutions of Liquid Hydrocarbon
Mixtures in Water.
AD-A174 703

*SOOT
Transport Phenomena and
Interfacial Kinetics in Multiphase
Combustion Systems.*
AD-A174 826
Fuels Combustion Research.*
AD-A175 040

*SOURCES
High Power, Millimeter-
Wavelength, Coherent Radiation
Sources.*
AD-A174 521

*SPACE SYSTEMS
Passively Damped Joints for
Advanced Space Structures.*
AD-A174 914

*SPACECRAFT
The Control Theory of Flexible
and Articulated Spacecraft.*
AD-A174 880

SUBJECT INDEX-19
UNCLASSIFIED EVJ58L

SIG-SPA

UNCLASSIFIED

Nonlinear Analysis and Optimal Design of Dynamic Mechanical Systems for Spacecraft Application.*

AD-A175 002

Thermoviscoelastic Characterization and Analysis of Fiber Composite Space Structures.*

AD-A175 024

*SPARSE MATRIX

Sparse Elimination on Vector Multiprocessors.*

AD-A175 121

*SPECTRAL LINES

Saturation and Spectral Line Behavior in the Resonant CARS spectrum of OH.*

AD-A174 436

*SPEECH ANALYSIS

Reprint: A Theorem of I. Schur and its Impact on Modern Signal Processing.

AD-A174 881

*SPRAYS

Dense-Spray Structure and Phenomena.*

AD-A174 683

*STABILIZATION

Reprint: Feedback Stabilization of State Delayed Systems via a Reducing Transformation.

AD-A175 080

*STALLING

Dynamic Stall Penetration Experiments on a Swept Wing.*

AD-A174 962

*STARK EFFECT

High Speed Low Power Nonlinear Optical Signal Processing.*

AD-A174 492

*STATISTICAL ANALYSIS

Are Mass Extinctions Really Periodic?*

AD-A174 290

On First Passage Times and Differential Equations.*

AD-A174 848

The Study of Certain Aspects of Probability with Applications in Communication Theory.*

AD-A174 919

Continuum Structure Functions.*

AD-A175 005

*STATISTICAL INFERENCE

Non-Orthogonal Designs for Measuring Dispersion.*

AD-A175 060

*STATISTICAL MECHANICS

Nonlinear Wave Propagation.*

AD-A175 073

*STATISTICAL PROCESSES

Continuity of Gaussian Processes.*

AD-A174 738

*STATISTICAL SAMPLES

Sampling Plans Excluding Contiguous Units.*

AD-A174 528

*STATISTICAL TESTS

Robust Optimum Invariant Tests of Covariance Structures Useful in Linear Models.*

AD-A174 659

*STELLAR ATMOSPHERES

Reprint: Isomers and Excitation Energies of C sub 4.

AD-A174 601

*STIFFNESS

Investigation and Synthesis of High Temperature and Increased Stiffness RSP Aluminum Alloys.*

AD-A174 588

*STOCHASTIC CONTROL

Reprint: Analysis of an Identification Algorithm Arising in the Adaptive Estimation of Markov

Chains.

AD-A175 081

*STOCHASTIC PROCESSES

Stochastic Evolution Equations with Values on the Dual of a Countably Hilbert Nuclear Space.*

AD-A174 876

Summary of Accomplished Work under the Air Force Grant AFOSR-83-0229.*

AD-A174 938

Distribution of the Maximum of a Gaussian Process by Monte Carlo.*

AD-A175 029

Reprint: On Stationarity of the Solution of a Doubly Stochastic Model.

AD-A175 035

*STRAIN RATE

Material Structure in Viscoplasticity: An Extension of Bodner's Theory.*

AD-A174 990

*STRESS CORROSION

Stress Corrosion Cracking of Wrought and P/M High Strength Aluminum Alloys.*

AD-A174 435

*STRUCTURAL ANALYSIS

Dynamic Analyses of Two-Dimensional Lattices.*

AD-A174 802

*STRUCTURAL PROPERTIES

Reprint: A Theorem of I. Schur and its Impact on Modern Signal Processing.

AD-A174 881

*STRUCTURAL RESPONSE

Local-global Interactions in the Transient Response of Lattice-Truss Plates.*

AD-A174 666

*STRUCTURES

Passively Damped Joints for

SUBJECT INDEX-20
UNCLASSIFIED EVJ56L

SPA-STR

UNCLASSIFIED

- Advanced Space Structures.*
AD-A174 914
- *SUBSONIC FLOW
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.*
AD-A174 520
- *SUPERCONDUCTORS
Thin Superconducting Film Characterization by Surface Acoustic Waves.*
AD-A174 904
System for Investigating Superconducting Films with Surface Acoustic Waves Down to 4.5 Millikelvin and Up to 4 GHz.*
AD-A174 910
- *SUPERSONIC FLOW
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.*
AD-A174 520
On the Prediction of Highly Vortical Flows Using an Euler Equation Model.*
AD-A174 831
Study of Separation and Vortices in Rotational Inviscid Flows.*
AD-A175 070
- *SURFACE ACOUSTIC WAVES
Thin Superconducting Film Characterization by Surface Acoustic Waves.*
AD-A174 904
System for Investigating Superconducting Films with Surface Acoustic Waves Down to 4.5 Millikelvin and Up to 4 GHz.*
AD-A174 910
- *SURFACE CHEMISTRY
Theory of Laser-Induced Phenomena on Conventional and Phase-Conjugated Surfaces.*
AD-A174 484
Investigation of Surface Phenomena in Thermionic Energy Conversion.*
AD-A174 916
Reprint: The Effects of Surface Facets on the Oxidation of Aluminum (111) Surfaces.
AD-A175 131
- *SWEPT WINGS
Dynamic Stall Penetration Experiments on a Swept Wing.*
AD-A174 962
- *SYMBOLS
Optical Symbolic Processor for Expert System Execution.*
AD-A174 955
- *SYSTEMS ANALYSIS
Effects of Assuming Independent Component Failure Times, If They Are Actually Dependent, in a Series System.*
AD-A174 825
Reprint: System Structure Analysis: Clustering with Data Bindings.
AD-A175 031
- *SYSTEMS APPROACH
Research on Problem-Solving Systems.*
AD-A174 940
- *SYSTEMS ENGINEERING
Computer-Aided Structural Design Optimization Using a Database Management System.*
AD-A174 450
A Database Management System for Engineering Applications.*
AD-A174 908
- *TEA LASERS
Optically Pumped Short Wavelength Lasers.*
AD-A174 985
- *THERMAL EXPANSION
Ultra-Low Thermal Expansion Ceramics.*
AD-A174 530
- *THERMIONIC CONVERTERS
Investigation of Surface Phenomena in Thermionic Energy Conversion.*
AD-A174 916
- *THERMODYNAMIC PROPERTIES
Reprint: A Thermodynamic Study of Solutions of Liquid Hydrocarbon Mixtures in Water.
AD-A174 703
- *THERMOSPHERE
The Analysis Phase of MITRAS.*
AD-A174 803
- *THIN FILMS
Signal Processing with Degenerate Four-Wave Mixing.*
AD-A174 427
Thin-Film Optoelectronic Circuits Research Program.*
AD-A174 872
Thin Superconducting Film Characterization by Surface Acoustic Waves.*
AD-A174 904
Plasma Deposition of Silicon Carbide Thin Films.*
AD-A174 970
- *THREE DIMENSIONAL FLOW
Three-Dimensional Laminar Boundary Layers.*
AD-A175 010
Three-Dimensional Viscous Flow Solutions with a Vorticity - Stream Function Formulation.*
AD-A175 056
- *TITANIUM ALLOYS
Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.*
AD-A174 532
- *TOXIC HAZARDS
A Comparative Study Regarding the Association of Alpha-2U globulin with the Nephrotoxic Mechanism of Certain Petroleum-

SUBJECT INDEX-21
UNCLASSIFIED EVJSEL

SUB-TOX

UNCLASSIFIED

- Based Air Force Fuels.*
AD-A175 104
- *TOXICITY
A Study of the Toxicity of the
Metabolites of the Cruise Missile
Fuel JP-10 on Several Animal
Species.*
AD-A174 750
- *TOXICOLOGY
The Cytoskeleton: A Target for
Toxic Agents. Proceedings of the
Rochester International Conference
on Environmental Toxicity (16th)
Held in Rochester, New York on 4-8
June 1984.*
AD-A174 828
- *TRACKING
Reprint: Robust Asymptotic
Tracking for Linear Systems with
Unknown Parameters.
AD-A174 791
- *TREES
Optical Symbolic Processor for
Expert System Execution.*
AD-A174 955
- *TUBE GRIDS
Adaptive Grid Generation.*
AD-A174 942
- *TURBOMACHINERY
Analysis of Three-Dimensional
Viscous Internal Flows.*
AD-A174 497
- *TURBULENCE
Basic Instability Mechanisms in
Chemically Reacting Subsonic and
Supersonic Flows.*
AD-A174 920
Numerical Experiments on
Turbulent Mixing.*
AD-A174 703
Carbon Monoxide and Turbulence-
Chemistry Interactions Measurements
and Modeling of Turbulent Jet
Diffusion Flames.*
- AD-A174 951
TURBULENT BOUNDARY LAYER
Viscous Interactions at
Hypersonic Speed.*
AD-A174 882
The Study of Shock Wave and
Turbulent Boundary Layer
Interactions.*
AD-A175 033
- *TURBULENT FLOW
An Investigation of Flow
Structure, Mixing and Chemical
Reaction in Combusting Turbulent
Flows.*
AD-A174 515
Active Feedback Interaction with
a Shear Layer.*
AD-A174 544
Chemical Reactions in Turbulent
Mixing Flows.*
AD-A174 949
Numerical Simulation of
Turbulent Flames Using Vortex
Methods.*
AD-A174 987
Coherent Structure-Reflective
Turbulent Viscous Flow Modeling.*
AD-A175 195
Studies of Shear Flows.*
AD-A175 285
- *TWO PHASE FLOW
Finite-Difference Solutions for
Compressible Laminar Boundary-Layer
Flows of a Dusty Gas over a Semi-
Infinite Flat Plate.*
AD-A174 952
Asymptotic Solutions to
Compressible Laminar Boundary-Layer
Solutions for Dusty-Gas Flow over a
Semi-Infinite Flat Plate.*
AD-A175 008
- *UPPER ATMOSPHERE
The Analysis Phase of MITHRAS.*
AD-A174 803
- *URANIUM
Reprint: Relativistic
- Calculation of Atomic N-Shell
Ionization by Protons.
AD-A174 846
- *VANADIUM
Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.*
AD-A176 123
- *VAPOR DEPOSITION
Plasma Deposition of Silicon
Carbide Thin Films.*
AD-A174 970
- *VARIATIONAL PRINCIPLES
Models and Computational Methods
for Dynamic Friction Phenomena. I.
Physical Aspects of Dynamic
Friction. II. Continuum Models and
Variational Principles for Dynamic
Friction. III. Finite Element
Models and Numerical Analysis.*
AD-A174 917
- *VERTICAL TAKEOFF AIRCRAFT
Experiments in an Adaptable-Wall
Wind Tunnel for V/STOL Testing.*
AD-A174 900
- *VIBRATION
Optimum Aeroelastic
Characteristics for Composite
Supermaneuverable Aircraft.*
AD-A174 785
Reprint: A Stochastic
Characterization of the Sine
Function.
AD-A174 912
Optimal and Insensitive Control
of Hyperbolic Distributed Parameter
Systems with Applications to Wing
Flutter Problems.*
AD-A174 984
Nonlinear Analysis and Optimal
Design of Dynamic Mechanical
Systems for Spacecraft
Application.*
AD-A175 002
Research on Aero-Thermodynamic
Distortion Induced Structural

SUBJECT INDEX-22
UNCLASSIFIED EVJ50L

TOX-VIB

UNCLASSIFIED

Dynamic Response of Multi-Stage Compressor Blading.*
AD-A178 080
Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.*
AD-A178 804

*VISCOPLASTIC PROPERTIES
Material Structure in Viscoplasticity: An Extension of Bodnar's Theory.*
AD-A174 890

*VISCOUS FLOW
Analysis of Three-Dimensional Viscous Internal Flows.*
AD-A174 487
Viscous Interactions at Hypersonic Speed.*
AD-A174 882
Three-Dimensional Viscous Flow Solutions with a Vorticity - Stream Function Formulation.*
AD-A178 088
Coherent Structure-Reflective Turbulent Viscous Flow Modeling.*
AD-A178 195

*VISUAL ACUITY
Spatial and Temporal Visual Masking and Visibility.*
AD-A178 113

*VISUAL AIDS
Visual Temporal Filtering and Intermittent Visual Displays.*
AD-A174 773

*VISUAL PERCEPTION
Eye Movements and Visual Information Processing.*
AD-A178 182

*VORTEX SHEDDING
Study of Separation and Vortices in Rotational Inviscid Flows.*
AD-A178 070

*VORTICES

On the Prediction of Highly Vortical Flows Using an Euler Equation Model.*
AD-A174 831

Numerical Simulation of Turbulent Flames Using Vortex Methods.*
AD-A174 987

Three-Dimensional Viscous Flow Solutions with a Vorticity - Stream Function Formulation.*
AD-A178 086

Study of Separation and Vortices in Rotational Inviscid Flows.*
AD-A178 070

Development of a Device for Controlling the Leading Edge Vortices on a Delta Wing.*
AD-A178 207

*WAFERS
Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.*
AD-A174 718

*WAKE
Active Feedback Interaction with a Shear Layer.*
AD-A174 544

*WATER JETS
Dense-Spray Structure and Phenomena.*
AD-A174 883

*WAVE FUNCTIONS
Reprint: Relativistic Calculation of Atomic N-Shell Ionization by Protons.
AD-A174 848

*WAVE PROPAGATION
Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.*
AD-A174 718

*WAVEGUIDES

Signal Processing with Degenerate Four-Wave Mixing.*
AD-A174 427
Thin-Film Optoelectronic Circuits Research Program.*
AD-A174 872

*WIND TUNNELS
Experiments in an Adaptable-Wall Wind Tunnel for V/STOL Testing.*
AD-A174 900

*X RAY APPARATUS
Acquisition of an Analytical Electron Microscopy Facility.*
AD-A178 014

SUBJECT INDEX-23
UNCLASSIFIED EVJ58L

VIS-X R

PERSONAL AUTHOR INDEX

UNCLASSIFIED

PERSONAL AUTHOR INDEX

- *AARONSON, H. I. * * *
Fundamental Studies of Beta Phase
Decomposition Modes in Titanium
Alloys.
AD-A174 532
- *ABDEL-WANEED, M. * * *
Markovian Shock Models,
Deterioration Processes, Stratified
Markov Processes Replacement
Policies.
AD-A174 646
- *ABLOWITZ, MARK J. * * *
Nonlinear Wave Propagation.
AD-A175 073
- *ADLER, PHILIP N. * * *
Micro-Mechanisms of Deformation in
SiC/Al Composites.
AD-B107 755
- *AGGARWAL, S. K. * * *
Ignition of Fuel Sprays.
AD-A174 898
- *AGRAWAL, D. K. * * *
Ultra-Low Thermal Expansion
Ceramics.
AD-A174 530
- *ALEX, M. * * *
Design and Fabrication of Submicron
Magnetic Bubble Device Technology.
AD-A174 621
- *ALLEN, D. H. * * *
Research on Damage Models for
Continuous Fiber Composites.
AD-A175 017
- *ANDERSON, R. F. * * *
- Replacement with Non-Constant
Operating Cost.
AD-A175 034
- *ARAPOSTATHIS, ARISTOTLE * * *
Analysis of an Identification
Algorithm Arising in the Adaptive
Estimation of Markov Chains.
AD-A175 081
- *ARNOLD, STEVEN M. * * *
Thin-Film Optoelectronic Circuits
Research Program.
AD-A174 572
- *ARORA, JASBIR S. * * *
Computer-Aided Structural Design
Optimization Using a Database
Management System.
AD-A174 450
- A Database Management System for
Engineering Applications.
AD-A174 908
- *ASHMORE, J. G. * * *
Combined Polynomial and Near-
Dissociation Representations for
Diatomic Spectral Data: C12(X) and
I2(X).
AD-A175 015
- *AULD, B. A. * * *
Electromagnetic Sensor Arrays for
Nondestructive Evaluation and Robot
Control.
AD-A174 820
- *BACCCELLI, FRANCIS * * *
A Single Server Queue in a Hard-
Real-Time Environment.
AD-A174 604
- *BAHR, A. J. * * *
- Electromagnetic Sensor Arrays for
Nondestructive Evaluation and Robot
Control.
AD-A174 792
- *BAI, Z. D. * * *
Inference on the Occurrence/Exposure
Rate and Simple Risk Rate.
AD-A174 516
- *BAILLIEU, JOHN * * *
The Control Theory of Flexible and
Articulated Spacecraft.
AD-A174 880
- *BANKS, H. T. * * *
A Comparison of Stability and
Convergence Properties of
Techniques for Inverse Problems.
AD-A174 733
- The Identification of a Distributed
Parameter Model for a Flexible
Structure.
AD-A174 802
- *BARAKAT, RICHARD * * *
Optical Computing Strategies.
AD-A175 016
- *BARDINA, JORGE * * *
Closing Developments in Aerodynamic
Simulation with Disjoint Patched
Meshes.
AD-A175 072
- *BARENBERG, E. J. * * *
Three-Dimensional Finite Element
Analysis of a Slab on Stress
Dependent Elastic Solid Foundation.
AD-A174 987
- *BARLOW, R. E. * * *
Distributions with Monotone Failure

PERSONAL AUTHOR INDEX-1
UNCLASSIFIED EVJ56L

UNCLASSIFIED

- Rate,
AD-A174 873
- *BARNISH, B. R. * * *
Robust Asymptotic Tracking for
Linear Systems with Unknown
Parameters.
AD-A174 781
- *BARTLETT, RODNEY J. * * *
Hyperpolarizabilities of Hydrogen
Fluoride Molecule: A Discrepancy
Between Theory and experiment?
AD-A174 882
- * * *
Isomers and Excitation Energies of
C sub 4.
AD-A174 801
- * * *
Fifth-Order Many-Body Perturbation
Theory and its Relationship to
Various Coupled-Cluster Approaches.
AD-A175 047
- * * *
Isomers of Si2 C2: An MBPT Study.
AD-A175 082
- *BASILI, VICTOR R. * * *
System Structure Analysis:
Clustering with Data Bindings.
AD-A175 031
- *BAUER, C. L. * * *
Design and Fabrication of Submicron
Magnetic Bubble Device Technology.
AD-A174 821
- *BAXTER, J. P. * * *
Energy- and Angle-Resolved
Detection of Neutral Atoms Desorbed
from Ion Bombarded Single Crystals.
Rh(111) and p(2x2)O/Rh(111).
AD-A174 782
- *BAXTER, LAURENCE A. * * *
- Continuum Structure Functions.
AD-A175 008
- *BERNSTEIN, ARTHUR J. * * *
The Design and Implementation of a
Network Computer.
AD-A174 800
- *BERNSTEIN, I. M. * * *
Stress Corrosion Cracking of
Wrought and P/M High Strength
Aluminum Alloys.
AD-A174 438
- *BINFORD, THOMAS O. * * *
Center for Automation and
Manufacturing Science Established
at Stanford University.
AD-A174 887
- *BISCHEL, WILLIAM K. * * *
Two-Photon Detection Techniques for
Atomic Fluorine.
AD-A174 848
- *BISTRITZ, YUVAL * * *
Digital Cauer-Type Ladders for
Stable Filters.
AD-A174 800
- *BLANDFORD, GEORGE E. * * *
Three-Dimensional Elasto-Plastic
Analysis for Soils.
AD-A174 883
- *BLEVINS, CREED E. * * *
Passively Damped Joints for
Advanced Space Structures.
AD-A174 814
- *BLOUIN, SCOTT E. * * *
Experimental and Theoretical
Response of Multiphase Porous Media
- to Dynamic Loads.
AD-A174 748
- *BOEDEKER, L. R. * * *
Saturation and Spectral Line
Behavior in the Resonant CARS
spectrum of OH.
AD-A174 438
- *BOGDANOFF, SEYMOUR M. * * *
The Study of Shock Wave and
Turbulent Boundary Layer
Interactions.
AD-A175 033
- *BOMMAN, CHRIS * * *
Fabrication of Material and Devices
for Very High Density Information
Storage.
AD-A174 848
- *BOMMAN, CRAIG T. * * *
An Investigation of Flow Structure,
Mixing and Chemical Reaction in
Combusting Turbulent Flows.
AD-A174 818
- *BOZACK, M. J. * * *
Plasma Deposition of Silicon
Carbide Thin Films.
AD-A174 870
- *BRILL, THOMAS B. * * *
Structure/Property/Reactivity
Relationships Among Nitramines and
Newer Energetic Materials.
AD-A174 418
- *BROADWELL, J. E. * * *
Chemical Reactions in Turbulent
Mixing Flows.
AD-A174 848
- * * *
Chemical Reactions in Turbulent

PERSONAL AUTHOR INDEX-2
UNCLASSIFIED EVJ56L

BAR-BRO

UNCLASSIFIED

- Mixing Flows.
AD-A175 071
- *BURRIS, DAVID R. * * *
A Thermodynamic Study of Solutions
of Liquid Hydrocarbon Mixtures in
Water.
AD-A174 703
- *CALLAM, D. A. * * *
Sparse Elimination on Vector
Multiprocessors.
AD-A175 121
- *CAMPBELL, R. O. * * *
Design and Fabrication of Submicron
Magnetic Bubble Device Technology.
AD-A174 821
- *CANDLER, GRAHAM V. * * *
Computation of three Dimensional
Viscous Compressible Flow at
Hypersonic Velocity.
AD-A174 908
- *CANNON, ROBERT H. * * *
Center for Automation and
Manufacturing Science Established
at Stanford University.
AD-A174 887
- *CANTWELL, BRIAN J. * * *
An Investigation of Flow Structure,
Mixing and Chemical Reaction in
Combusting Turbulent Flows.
AD-A174 515
- *CARROLL, R. J. * * *
Variance Functions and the Minimum
Detectable Concentration in Assays.
AD-A174 983
- *CARROLL, RAYMOND * * *
High Speed Low Power Nonlinear
- Variance Function Estimation.
AD-A174 981
- *CARROLL, RAYMOND J. * * *
Adapting for Heteroscedasticity in
Regression Models.
AD-A174 864
- *CARTER, J. E. * * *
Three-Dimensional Viscous Flow
Solutions with a Vorticity - Stream
Function Formulation.
AD-A175 066
- *CASASANT, DAVID * * *
Optical Data Processing.
AD-A174 485
- *CHAPMAN, DEAN R. * * *
Coherent Structure Modeling of
Viscous Sublayer Turbulence for
Incompressible Flow with Heat
Transfer.
AD-A175 184
- *CHEN, MAU H. * * *
Relativist Calculation of Atomic N-
Shell Ionization by Protons.
AD-A174 848
- *CHOYKE, W. J. * * *
Plasma Deposition of Silicon
Carbide Thin Films.
AD-A174 970
- *CHU, CHENG C. * * *
Robust Control of Multivariable and
Large Scale Systems.
AD-A175 058
- *CINLAR, E. * * *
Reliability of Complex Devices in
Random Environments.
AD-A174 953
- *CLARKSON, THOMAS W. * * *
The Cytoskeleton: A Target for
Toxic Agents. Proceedings of the
Rochester International Conference
on Environmental Toxicity (16th)
Held in Rochester, New York on 4-8
June 1984.
AD-A174 928
- *CORREA, S. M. * * *
Carbon Monoxide and Turbulence-
Chemistry Interactions Measurements
and Modeling of Turbulent Jet
Diffusion Flames.
AD-A174 951
- *CRASEMANN, BERND * * *
Relativist Calculation of Atomic N-
Shell Ionization by Protons.
AD-A174 848
- *DAGENAIS, MARIO * * *
High Speed Low Power Nonlinear

PERSONAL AUTHOR INDEX-3
UNCLASSIFIED EVJ56L

BUR-DAG

UNCLASSIFIED

Optical Signal Processing.
AD-A174 492

*DALLEY, A. M. * * *

Fundamental Studies of Beta Phase
Decomposition Modes in Titanium
Alloys.
AD-A174 532

*DARVILLE, JACQUES * * *

Infrared-Laser Excitation of the
Internal Vibrational Mode of a
Diatomic Molecule Adsorbed on a
Metal Surface.
AD-A174 211

*DAS, RITA * * *

Robust Optimum Invariant Tests of
Covariance Structures Useful in
Linear Models.
AD-A174 659

*DAVIDIAN, M. * * *

Variance Functions and the Minimum
Detectable Concentration in Assays.
AD-A174 983

*DAVIDIAN, MARIE * * *

Variance Function Estimation.
AD-A174 961

*DAVIS, P. R. * * *

Investigation of Surface Phenomena
in Thermionic Energy Conversion.
AD-A174 916

*DAVIS, R. L. * * *

Three-Dimensional Viscous Flow
Solutions with a Vorticity - Stream
Function Formulation.
AD-A175 056

*DEMNER, JOSEPH L. * * *

The Gordon Research Conference on
Electron Spectroscopy Held in
Wolfeboro, New Hampshire on 14-18
July 1986.
AD-A174 788

*DEMNER, PATRICIA M. * * *

The Gordon Research Conference on
Multiphoton Processes Held in New
London, New Hampshire on 9-13 June
1986.
AD-A174 764

*DE LA BEAUJARDIERE, ODILE * * *

The Analysis Phase of NITRAS.
AD-A174 803

*DERSTINE, MATTHEW * * *

Optical Symbolic Processor for
Expert System Execution.
AD-A174 955

*DESAI, C. S. * * *

Constitutive Modelling of Concrete
and Rocks Under Multiaxial
Compressive Loadings.
AD-A174 451

*DESTLER, WILLIAM W. * * *

Department of Defense
Instrumentation Award.
AD-A174 868

*DICKINSON, BRADLEY W. * * *

Dynamic Realizations of Sufficient
Sequences.
AD-A174 538

*DIMOTAKIS, P. E. * * *

Active Feedback Interaction with a
Shear Layer.
AD-A174 544

Chemical Reactions in Turbulent

Mixing Flows.
AD-A174 948

* * *
Chemical Reactions in Turbulent
Mixing Flows.
AD-A175 071

*DORRY, RICARDO * * *

A Self Consistent Estimate of the
Elastic Constants of a Random Array
of Equal Spheres with Application
to Granular Soil under Isotropic
Conditions.
AD-A174 443

*DONNELLY, J. * * *

Three-Dimensional Finite Element
Analysis of a Slab on Stress
Dependent Elastic Solid Foundation.
AD-A174 987

*DOYLE, JOHN C. * * *

Robust Control of Multivariable and
Large Scale Systems.
AD-A175 058

*DRYER, F. L. * * *

Lumped Model Generation and
Evaluation: Sensitivity and Lie
Algebraic Techniques with
Applications to Combustion.
AD-A174 984

* * *
Fuels Combustion Research.
AD-A175 040

*DUGUNDJI, JOHN * * *

Fluid Dynamic - Structural
Interactions of Labyrinth Seals.
AD-A174 481

* * *

Fluid Dynamic - Structural
Interactions of Labyrinth Seals.
AD-A174 780

*DUQUETTE, D. J. * * *

PERSONAL AUTHOR INDEX-4
UNCLASSIFIED EVJ56L

DAL-DUQ

UNCLASSIFIED

- * * *
Acquisition of an Analytical
Electron Microscopy Facility.
AD-A178 014
- *DVRAK, GEORGE J. * * *
Analytical and Experimental
Characterization of Damage
Processes in Composite Laminates.
AD-A174 881
- *EURELL, THOMAS E. * * *
A Comparative Study Regarding the
Association of Alpha-2u Globulin
with the Nephrotoxic Mechanism of
Certain Petroleum-Based Air Force
Fuels.
AD-A175 104
- *FAETH, G. M. * * *
Dense-Spray Structure and
Phenomena.
AD-A174 883
- *FIAGBEDZI, Y. A. * * *
Feedback Stabilization of State
Delayed Systems via a Reducing
Transformation.
AD-A175 080
- *FIENUP, JAMES R. * * *
Diffraction-Limited Imaging of
Space Objects III.
AD-A174 100
- *FINE, MORRIS E. * * *
Investigation and Synthesis of High
Temperature and Increased Stiffness
RSP Aluminum Alloys.
AD-A174 598
- *FLEETER, SANFORD * * *
Research on Aero-Thermodynamic
Distortion Induced Structural
- Dynamic Response of Multi-Stage
Compressor Blading.
AD-A175 080 * * *
Research on Aero-Thermodynamic
Distortion Induced Structural
Dynamic Response of Multi-Stage
Compressor Blading.
AD-A175 904
- *FONTJUN, ARTHUR * * *
Combustion Kinetics of Metal Oxide
and Halide Radicals and Metal
Atoms.
AD-A174 478
- *FRASER, HAMISH L. * * *
Rapid Solidification Processing and
Powder Metallurgy of Al Alloys.
AD-A174 553
- * * *
Al and Mg Alloys for Aerospace
Applications Using Rapid
Solidification and Powder
Metallurgy Processing.
AD-A175 030
- *FURUHARA, T. * * *
Fundamental Studies of Beta Phase
Decomposition Modes in Titanium
Alloys.
AD-A174 532
- *GAD-EL-HAK, MOHAMED * * *
Development of a Device for
Controlling the Leading Edge
Vortices on a Delta Wing.
AD-A175 207
- *GATES, S. S. * * *
The Identification of a Distributed
Parameter Model for a Flexible
Structure.
AD-A174 802
- *GATOS, HARRY C.
- * * *
Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.
AD-A176 123
- *GEORGE, THOMAS F. * * *
Infrared-Laser Excitation of the
Internal Vibrational Mode of a
Diatomic Molecule Adsorbed on a
Metal Surface.
AD-A174 211
- * * *
Theory of Laser-Induced Phenomena
on Conventional and Phase-
Conjugated Surfaces.
AD-A174 484
- *GEVINS, ALAN S. * * *
Neuroelectric Predictors of
Performance Accuracy.
AD-A174 575
- *GHIA, KIRTI N. * * *
Analysis of Three-Dimensional
Viscous Internal Flows.
AD-A174 497
- *GHIA, URMILA * * *
Analysis of Three-Dimensional
Viscous Internal Flows.
AD-A174 497
- *GHONIEM, AHMED F. * * *
Numerical Simulation of Turbulent
Flames Using Vortex Methods.
AD-A174 987
- *GHOSH, SUBIR * * *
Two New Series of Search Designs
for 3(m) Factorial Experiments.
AD-A174 429
- * * *
Non-Orthogonal Designs for
Measuring Dispersion.

PERSONAL AUTHOR INDEX-5
UNCLASSIFIED EVJ56L

DVO-GM0

UNCLASSIFIED

AD-A175 060	Machinery Using Variable Dynamic Stiffness Squeeze Films. Volume 2. AD-A174 433	Fundamental Quantum 1/F Noise in Ultrasmall Semi Conductor Devices and Their Optimal Design Principles. AD-A174 512
*GISELING, H. J. * * *		
AD-A175 028	Flow through a Compressor Stage. AD-A175 028	*HARDIN, ROBBY O. * * *
*GILLES, JEAN-MARIE * * *	Design and Fabrication of Submicron Magnetic Bubble Device Technology. AD-A174 621	Three-Dimensional Elasto-Plastic Analysis for Solis. AD-A174 583
Infrared-Laser Excitation of the Internal Vibrational Mode of a Diatomic Molecule Adsorbed on a Metal Surface. AD-A174 211	*GRIZZLE, JESSY W. * * *	*HARRIS, C. E. * * *
*GIMPLE, M. * * *	Optimal Control of Systems Possessing Symmetries. AD-A174 702	Research on Damage Models for Continuous Fiber Composites. AD-A175 017
Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control. AD-A174 620	*GROSSI, MARIO D. * * *	*HARRISON, ROBERT J. * * *
*GLASS, I. I. * * *	Analytical/Experimental Investigation of Corpuscular Radiation Detectors. AD-B108 363	Isomers and Excitation Energies of C sub 4. AD-A174 601
Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate. AD-A174 952	*GUEST, CLARK * * *	*HART, GEORGE A. * * *
Asymptotic Solutions to Compressible Laminar Boundary-Layer Solutions for Dusty-Gas Flow over a Semi-Infinite Flat Plate. AD-A175 006	OCCAM First Quarterly Research and Development Status Report: June-August 1986. AD-A174 957	Short Wavelength Chemical Laser (SWCL) Technology. AD-C040 023
*GLASSMAN, I. * * *	*GUHA, ALOKE * * *	*HASHIN, ZVI * * *
Fuels Combustion Research. AD-A175 040	Optical Symbolic Processor for Expert System Execution. AD-A174 955	Thermoviscoelastic Characterization and Analysis of Fiber Composite Space Structures. AD-A175 024
*GOLDMAN, MARTIN V. * * *	*HAERDE, WOLFGANG * * *	*HASOFER, A. M. * * *
Plasma Wave Turbulence and Electromagnetic Radiation Caused by Electron Beams. AD-A174 711	Optimal Bandwidth Selection in Nonparametric Regression Function Estimation. AD-A174 537	Distribution of the Maximum of a Gaussian Process by Monte Carlo. AD-A175 029
*GOODWIN, M. J. * * *	*HAFEZ, M. * * *	*HEDAYAT, A. * * *
Vibration Control in Rotating	Three-Dimensional Viscous Flow Solutions with a Vorticity - Stream Function Formulation. AD-A175 056	Design of Experiments and Reliability Models. AD-A174 738
	*HANDEL, PETER H.	*HEDAYAT, A. S.

PERSONAL AUTHOR INDEX-8
UNCLASSIFIED EVJ56L

GIB-MED

UNCLASSIFIED

- * * *
 Sampling Plans Excluding Contiguous Units.
 AD-A174 528
- * * *
 Fractional Factorial Designs in the Form of Incomplete Orthogonal Arrays.
 AD-A174 568
- * * *
 Recent Discoveries on A-Optimal Designs for Comparing Test Treatments with Controls.
 AD-A174 845
- *HELSTROM, CARL W. * * *
 Calculation of Cumulative Distributions and Detection Probabilities in Communications and Optics.
 AD-A175 082
- *HERNANDEZ-LERMA, O. * * *
 Adaptive Control of Discounted Markov Decision Chains.
 AD-A174 453
- *HEUER, A. H. * * *
 A Fundamental Study of the Bonding of Thermal Barrier Coatings.
 AD-A174 784
- *HIRLEMAN, E. D. * * *
 Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.
 AD-A174 428
- *HOKENSON, GUSTAVE J. * * *
 Coherent Structure-Reflective Turbulent Viscous Flow Modeling.
 AD-A175 195
- *HOLDEN, MICHAEL S. * * *
- Viscous Interactions at Hypersonic Speed.
 AD-A174 682
- *HOLLANDER, MYLES * * *
 Confidence Bands under Proportional Hazards.
 AD-A174 523
- * * *
 Tests Conditional on Imbalance with Biased Coin Designs.
 AD-A174 777
- *HONG, S. J. * * *
 Variational Principles for Dynamics of Linear Elastic Fluid-Saturated Soils.
 AD-A175 020
- *HUANG, CHING-HSING * * *
 Fabrication of Material and Devices for Very High Density Information Storage.
 AD-A174 548
- *HUANG, XI-YI * * *
 Theory of Laser-Induced Phenomena on Conventional and Phase-Conjugated Surfaces.
 AD-A174 484
- *HUMPHREYS, E. A. * * *
 Thermoelastic Characterization and Analysis of Fiber Composite Space Structures.
 AD-A175 024
- *HUTCHENS, DAVID H. * * *
 System Structure Analysis: Clustering with Data Bindings.
 AD-A175 031
- *ILES, D. W. * * *
 A Comparison of Stability and
- Convergence Properties of Techniques for Inverse Problems.
 AD-A174 733
- *IOANNIDES, A. M. * * *
 Three-Dimensional Finite Element Analysis of a Slab on Stress Dependent Elastic Solid Foundation.
 AD-A174 987
- *JOAG-DEV, KUMAR * * *
 A Covariance Inequality for Coherent Structures.
 AD-A174 889
- *JOHNSON, PHILIP M. * * *
 The Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 9-13 June 1986.
 AD-A174 764
- *JOHNSTON, J. P. * * *
 Studies of Shear Flows.
 AD-A175 285
- *JOSEPH, JOACHIM H. * * *
 The Morphology of Broken Cloud Fields over Ocean Surfaces Using LANDSAT.
 AD-A174 944
- *JOVER, J. M. * * *
 On the Analysis of Synchronous Computing Arrays.
 AD-A175 055
- *KAILATH, T. * * *
 On the Analysis of Synchronous Computing Arrays.
 AD-A175 055
- *KAILATH, THOMAS * * *

PERSONAL AUTHOR INDEX-7
 UNCLASSIFIED EVJ56L

HEL-KAI

UNCLASSIFIED

- A Theorem of I. Schur and its Impact on Modern Signal Processing.
AD-A174 881
- *KALISKI, MARTIN E. * * *
Asynchronous Discrete Control of Continuous Processes.
AD-A174 525
- *KALLEMBERG, OLAV * * *
On the Theory of Conditioning in Point Processes.
AD-A174 500
- *KALLIANPUR, G. * * *
Stochastic Evolution Equations with Values on the Dual of a Countably Hilbert Nuclear Space.
AD-A174 878
- * * *
Some Recent Results in Nonlinear Filtering Theory with Finitely Additive White Noise.
AD-A174 878
- *KALMAN, R. E. * * *
Mathematical Techniques for System Realization and Identification.
AD-A174 487
- *KAMMASH, T. * * *
Interaction of Charged Particle Beams with Pre-Ionized Channels.
AD-A175 049
- *KASPER, RAPHAEL * * *
Renewing U.S. Mathematics; Critical Resource for the Future.
AD-A174 545
- *KATZ, I. N. * * *
The p-Version of the Finite Element Method.
AD-A174 963
- *KEDEM, BENJAMIN * * *
A Stochastic Characterization of the Sine Function.
AD-A174 912
- * * *
On Frequency Detection by Zero-Crossings.
AD-A174 930
- *KHURI-YAKUB, B. T. * * *
The Air Force Office of Scientific Research for Low-Frequency Acoustic Microscope.
AD-A174 480
- *KIM, KWANG J. * * *
Experimental and Theoretical Response of Multiphase Porous Media to Dynamic Loads.
AD-A174 749
- *KING, MERRILL K. * * *
A Finite-Rate-Kinetics Model for Formation of Liquid Boron Oxide in a Nozzle Expansion Processes.
AD-B107 982L
- *KINRA, VIKRAM K. * * *
Research on Characterization of Damage States in Continuous Fiber Composites Using Ultrasonic Nondestructive Evaluation.
AD-A175 004
- *KLEIN, JOHN P. * * *
Effects of Assuming Independent Component Failure Times, If They Are Actually Dependent, in a Series System.
AD-A174 825
- *KLINE, L. E. * * *
Plasma Deposition of Silicon Carbide Thin Films.
- AD-A174 970
- *KLINE, S. J. * * *
Studies of Shear Flows.
AD-A175 285
- *KOBIRIN, P. H. * * *
Energy- and Angle-Resolved Detection of Neutral Atoms Desorbed from Ion Bombarded Single Crystals. Rh(111) and p(2x2)O/Rh(111).
AD-A174 762
- *KOO, JOSEPH H. * * *
Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.
AD-A174 428
- *KOOCHESFAHANI, M. M. * * *
Active Feedback Interaction with a Shear Layer.
AD-A174 544
- *KOSKO, BART * * *
OCCAM First Quarterly Research and Development Status Report: June-August 1986.
AD-A174 957
- *KOWLER, EILEEN * * *
Eye Movements and Visual Information Processing.
AD-A178 162
- *KRISHNAIAH, P. R. * * *
Inference on the Occurrence/Exposure Rate and Simple Risk Rate.
AD-A174 516
- *KRISHNAN, MAHADEVAN * * *
Optically Pumped Short Wavelength

PERSONAL AUTHOR INDEX-8
UNCLASSIFIED EVJ56L

KAL-KRI

UNCLASSIFIED

Lasers. AD-A174 985	Stochastic Approximation Algorithms. AD-A175 028	Approximate and Local Linearizability of Nonlinear Discrete-Time Systems. AD-A174 823
*KROEMER, HERBERT * * *	*LAGOWSKI, JACEK * * *	*LEE, JHIN HO * * *
Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic. AD-A174 580	Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing. AD-A176 123	Viscous Interactions at Hypersonic Speed. AD-A174 882
*KRYDER, M. H. * * *	*LAM, Y. F. * * *	*LEE, LONG C. * * *
Design and Fabrication of Submicron Magnetic Bubble Device Technology. AD-A174 821	A Survey of Network Reliability Modeling and Calculations. AD-A175 053	Electron Production, Electron Attachment, and Charge Recombination Process in High Pressure Gas Discharges. AD-A175 011
High Density Ion Implanted Contiguous Disk Bubble Technology. AD-A174 999	An Improved Algorithm for Performance Analysis of Networks with Unreliable Components. AD-A176 263	*LEE, SAMSON S. * * *
*KRYDER, MARK H. * * *	*LAMBORN, M. J. * * *	Dynamic Analyses of Two-Dimensional Lattices. AD-A174 802
Fabrication of Material and Devices for Very High Density Information Storage. AD-A174 548	Damage Models for Delamination and Transverse Fracture in Fibrous Composites. AD-A174 881	*LEE, SING H. * * *
*KUCHARSKI, STANISLAW A. * * *	*LAWS, NORMAN * * *	Parallel Optical Data Processing. AD-A174 853
Fifth-Order Many-Body Perturbation Theory and its Relationship to Various Coupled-Cluster Approaches. AD-A175 047	Analytical and Experimental Characterization of Damage Processes in Composite Laminates. AD-A174 991	*LEFEBVRES, A. H. * * *
*KULKARNI, V. G. * * *	*LEE, D. C. * * *	Fuel Spray Ignition by Hot Surfaces and Stabilization of Aircraft Fires. AD-A174 852
On Modeling the Performance and Reliability of Multimode Computer Systems. AD-A176 193	Experiments in an Adaptable-Wall Wind Tunnel for V/STOL Testing. AD-A174 900	*LEGER, CAROL A. * * *
*KUN, ERNEST * * *	*LEE, H. J. * * *	The Analysis Phase of MITHRAS. AD-A174 803
Cloning of the poly(ADP-ribose) Gene from Rat Liver. AD-A174 887	Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys. AD-A174 532	*LEIGHTON, F. T. * * *
*KUSHNER, HAROLD J. * * *	*LEE, HONG-GI * * *	Theoretical Aspects of VLSI (Very Large Scale Integration) Circuit Design. AD-A175 051
Asymptotic Properties of Distributed and Communicating		*LENAIN, G. E. * * *

PERSONAL AUTHOR INDEX-9
UNCLASSIFIED EVJ56L

KRO-LEN

UNCLASSIFIED

- Ultra-Low Thermal Expansion
Ceramics.
AD-A174 530
- *LEONARD, A. * * *
Chemical Reactions in Turbulent
Mixing Flows.
AD-A175 071
- *LES, J. * * *
Interaction of Charged Particle
Beams with Pre-Ionized Channels.
AD-A175 049
- *LEVI, MARK * * *
The Control Theory of Flexible and
Articulated Spacecraft.
AD-A174 880
- *LEVY, MOISE * * *
Thin Superconducting Film
Characterization by Surface
Acoustic Waves.
AD-A174 904
- *LEVY, MOISE * * *
System for Investigating
Superconducting Films with Surface
Acoustic Waves Down to 4.5
Millikelvin and Up to 4 GHz.
AD-A174 910
- *LEV-ARZ, H. * * *
Stable and Efficient 2-D Lattice
Filters.
AD-A174 431
- *LEV-ARIN, H. * * *
On the Analysis of Synchronous
Computing Arrays.
AD-A175 055
- *LI, VICTOR O. * * *
A Survey of Network Reliability
Modeling and Calculations.
- AD-A175 053 * * *
An Improved Algorithm for
Performance Analysis of Networks
with Unreliable Components.
AD-A176 263
- *LIEPMANN, H. W. * * *
Chemical Reactions in Turbulent
Mixing Flows.
AD-A174 949
- *LIN, J. T. * * *
Theory of Laser-Induced Phenomena
on Conventional and Phase-
Conjugated Surfaces.
AD-A174 484
- *LIO, Y. L. * * *
On the Mean Squared Error of
Nonparametric Quantile Estimators
under Random Right-Censorship.
AD-A174 517
- *LIU, YIH-CHIAO * * *
A Note on Estimation with Quantized
Data.
AD-A174 561
- *LOMBARD, CHARLES K. * * *
Closing Developments in Aerodynamic
Simulation with Disjoint Patched
Meshes.
AD-A174 958
- *LONG, STEPHEN I. * * *
Closing Developments in Aerodynamic
Simulation with Disjoint Patched
Meshes.
AD-A175 072
- *LORBER, PETER F. * * *
Dynamic Stall Penetration
Experiments on a Swept Wing.
AD-A174 982
- *MACCORMACK, ROBERT W. * * *
Computation of three Dimensional
Viscous Compressible Flow at
Hypersonic Velocity.
AD-A174 968
- *MACINTYRE, WILLIAM G. * * *
A Thermodynamic Study of Solutions
of Liquid Hydrocarbon Mixtures in
Water.
AD-A174 703
- *MAGERS, DAVID H. * * *
Isomers and Excitation Energies of
C sub 4.
AD-A174 601
- *MAJUMDAR, DIBYEN * * *
Recent Discoveries on A-Optimal
Designs for Comparing Test
Treatments with Controls.
AD-A174 945
- *MANNA, ZOHAR * * *
A Deductive Approach to Computer
Programming.
AD-A175 249
- *MARBLE, FRANK E. * * *
Mechanisms of Exciting Pressure
Oscillations in Ramjet Engines.
AD-A174 608
- *MARCONI, FRANK * * *
On the Prediction of Highly
Vortical Flows Using an Euler
Equation Model.
AD-A174 831

PERSONAL AUTHOR INDEX-10
UNCLASSIFIED EVJ86L

LEO-MAR

UNCLASSIFIED

- Study of Separation and Vortices in Rotational Inviscid Flows.
AD-A178 070
- *MARCUS, S. I. * * *
- Adaptive Control of Discounted Markov Decision Chains.
AD-A174 483
- *MARCUS, STEVEN I. * * *
- Approximate and Local Linearizability of Nonlinear Discrete-Time Systems.
AD-A174 623
- * * *
- Optimal Control of Systems Possessing Symmetries.
AD-A174 702
- * * *
- Analysis of an Identification Algorithm Arising in the Adaptive Estimation of Markov Chains.
AD-A175 081
- *MARRON, JAMES S. * * *
- Optimal Bandwidth Selection in Nonparametric Regression Function Estimation.
AD-A174 537
- *MARTINEZ-SANCHEZ, MANUEL * * *
- Fluid Dynamic - Structural Interactions of Labyrinth Seals.
AD-A174 461
- * * *
- Fluid Dynamic - Structural Interactions of Labyrinth Seals.
AD-A174 780
- *MARTINS, J. A. * * *
- Models and Computational Methods for Dynamic Friction Phenomena. I. Physical Aspects of Dynamic Friction. II. Continuum Models and Variational Principles for Dynamic
- Friction. III. Finite Element Models and Numerical Analysis.
AD-A174 817
- *MAZUMDER, JYOTIRMOY * * *
- The Role of the Plasma during Laser-Gas Laser-Metal Interactions.
AD-A174 579
- *MCDONALD, H. * * *
- Flow through a Compressor Stage.
AD-A175 028
- *MCKINSTRY, H. A. * * *
- Ultra-Low Thermal Expansion Ceramics.
AD-A174 530
- *MEINDL, JAMES D. * * *
- Center for Automation and Manufacturing Science Established at Stanford University.
AD-A174 657
- *MISCHAIKOV, KONSTANTIN * * *
- Bifurcations into Pathology for Hamiltonian Systems.
AD-A174 781
- *MITCHELL, T. E. * * *
- A Fundamental Study of the Bonding of Thermal Barrier Coatings.
AD-A174 784
- *MOESCHBERGER, MELVIN L. * * *
- Effects of Assuming Independent Component Failure Times, If They Are Actually Dependent, in a Series System.
AD-A174 825
- *MOFFAT, R. J. * * *
- Studies of Shear Flows.
- AD-A175 285
- *MUKHOPADHYAY, SANTANU * * *
- A Database Management System for Engineering Applications.
AD-A174 908
- *MURTHY, S. N. * * *
- Fuel Spray Ignition by Hot Surfaces and Stabilization of Aircraft Fires.
AD-A174 852
- *NAGARAJ, N. * * *
- Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.
AD-A175 072
- *NEVELL, ALAN * * *
- Markovian Shock Models, Deterioration Processes, Stratified Markov Processes and Replacement Policies.
AD-A174 885
- *NGUYEN, B. G. * * *
- Correlation Length and its Critical Exponents for Percolation Processes.
AD-A174 860
- *NICKEL, JOHN C. * * *
- International Symposium on Correlation and Polarization in Electron-Atom Collisions Held in Pasadena, California on 1-2 August 1985.
AD-A174 892
- *NICOLA, V. F. * * *
- On Modelling the Performance and Reliability of Multimode Computer Systems.

PERSONAL AUTHOR INDEX-11
UNCLASSIFIED EVJ56L

MAR-NIC

UNCLASSIFIED

- AD-A176 193
- *NITYANAND, M. * * *
Fundamental Studies of Beta Phase
Decomposition Modes in Titanium
Alloys.
AD-A174 532
- *NIXON, DAVID * * *
Fundamental Study of Jet Flows.
AD-A174 751
- *ODEN, J. T. * * *
Computational Methods for Nonlinear
Dynamics Problems in Solid and
Structural Mechanics: Models of
Dynamic Frictional Phenomena in
Metallic Structures.
AD-A174 585
- * * *
Models and Computational Methods
for Dynamic Friction Phenomena. I.
Physical Aspects of Dynamic
Friction. II. Continuum Models and
Variational Principles for Dynamic
Friction. III. Finite Element
Models and Numerical Analysis.
AD-A174 917
- *OLSEN, RICHARD G. * * *
Becton-Dickson Model 420
Fluorescence-Activated Cell Sorter
(FACS).
AD-A174 728
- *ORCUTT, JOHN A. * * *
Analysis of MSS (Marine Seismic
System) and OBS (Ocean Bottom
Seismograph) Data Collected during
the NGNDEI Seismic Experiment.
AD-A174 784
- *OTA, DALE K. * * *
Coherent Structure Modeling of
Viscous Sublayer Turbulence for
- Incompressible Flow with Heat
Transfer.
AD-A176 194
- *OYIBO, GABRIEL A. * * *
Optimum Aeroelastic Characteristics
for Composite Supersonic Airplane
Aircraft.
AD-A174 785
- *OZEKICI, S. * * *
Reliability of Complex Devices in
Random Environments.
AD-A174 953
- *PADGETT, K. J. * * *
Further Studies in Estimation of
Life Distribution Characteristics
from Censored Data.
AD-A174 629
- *PADGETT, W. J. * * *
On the Mean Squared Error of
Nonparametric Quantile Estimators
under Random Right-Censorship.
AD-A174 517
- *PAPANTONI-KAZAKOS, P. * * *
Summary of Accomplished Work under
the Air Force Grant AFOSR-83-0228.
AD-A174 938
- *PAPAZIAN, JOHN M. * * *
Micro-Mechanisms of Deformation in
SiC/Al Composites.
AD-B107 755
- *PARK, K. C. * * *
Local-Global Interactions in the
Transient Response of Lattice-Truss
Plates.
AD-A174 688
- *PARKER, S. R.
- Stable and Efficient 2-D Lattice
Filters.
AD-A174 431
- *PARTER, SEYMOUR V. * * *
Numerical Analysis.
AD-A174 936
- *PARTHASARATHY, R. N. * * *
Dense-Spray Structure and
Phenomena.
AD-A174 883
- *PARTLOW, W. D. * * *
Plasma Deposition of Silicon
Carbide Thin Films.
AD-A174 970
- *PEARLMAN, WILLIAM A. * * *
Simply Instrumentable and Optimal
Digitization of Analog Information
Sources.
AD-A176 187
- *PEARSON, A. E. * * *
Feedback Stabilization of State
Delayed Systems via a Reducing
Transformation.
AD-A176 080
- *PEEBLES, JAMES H. * * *
Passively Damped Joints for
Advanced Space Structures.
AD-A174 914
- *PENA, EDESEL * * *
Confidence Bands under Proportional
Hazards.
AD-A174 523
- Tests Conditional on Imbalance with
Biased Coin Designs.
AD-A174 777

PERSONAL AUTHOR INDEX-12
UNCLASSIFIED EVJ68L

NIT-PEN

*PEREMANS, ANDRE * * *
Infrared-Laser Excitation of the
Internal Vibrational Mode of a
Diatomic Molecule Adsorbed on a
Metal Surface.
AD-A174 211

*PEREZ-ABREU, V. * * *
Stochastic Evolution Equations with
Values on the Dual of a Countably
Hilbert Nuclear Space.
AD-A174 878

*PETRAKIS, ENMANJAL * * *
A Self Consistent Estimate of the
Elastic Constants of a Random Array
of Equal Spheres with Application
to Granular Soil under Isotropic
Conditions.
AD-A174 442

*PIERCE, DANIEL T. * * *
The Gordon Research Conference on
Electron Spectroscopy Held in
Wolfeboro, New Hampshire on 14-18
July 1988.
AD-A174 785

*PLEMONS, ROBERT J. * * *
Fast Algorithms for Structural
Analysis, Least Squares and Related
Computations.
AD-A175 078

*POPE, S. B. * * *
Numerical Experiments on Turbulent
Mixing.
AD-A174 783

*POURAHMADI, MOHSEN * * *
On Stationarity of the Solution of
a Doubly Stochastic Model.
AD-A175 038

*POWERS, EDWARD J. * * *
Joint Services Electronics Program.
AD-A174 318

*PROSCHAN, F. * * *
Distributions with Monotone Failure
Rate.
AD-A174 573

*PROSCHAN, FRANK * * *
A Covariance Inequality for
Coherent Structures.
AD-A174 889

*PRUCZ, JACKY C. * * *
Passively Damped Joints for
Advanced Space Structures.
AD-A174 914

*RABITZ, H. * * *
Lumped Model Generation and
Evaluation: Sensitivity and Lie
Algebraic Techniques with
Applications to Combustion.
AD-A174 984

*RAMNARAYAN, RAJA * * *
Optical Symbolic Processor for
Expert System Execution.
AD-A174 955

*RAND, S. C. * * *
Optical Fibers for Nonlinear
Optics.
AD-A174 518

*RAO, C. R. * * *
Sampling Plans Excluding Contiguous
Units.
AD-A174 528

*RAO, M. A. * * *
The Identification of a Distributed
Parameter Model for a Flexible
Structure.
AD-A174 802

*ROACH, M. P. * * *
Vibration Control in Rotating
Machinery Using Variable Dynamic
Stiffness Squeeze Films. Volume 2.
AD-A174 433

*ROACHE, PATRICK J. * * *
Adaptive Grid Generation.
AD-A174 942

*ROACH M. J. /GOODWIN, M. P. * * *
Vibration Control in Rotating
Machinery Using Variable Dynamic
Stiffness Squeeze-Films. Volume 1.
AD-A174 417

*ROCKSTROM, TODD J. * * *
The Role of the Plasma during Laser-
Gas Laser-Metal Interactions.
AD-A174 579

*ROSEN, I. G. * * *
The Identification of a Distributed
Parameter Model for a Flexible
Structure.
AD-A174 802

*ROSENGREEN, A. * * *

PERSONAL AUTHOR INDEX - 13
UNCLASSIFIED EVJ56L

PER-POS

UNCLASSIFIED

- * * *
Electromagnetic Sensor Arrays for
Nondestructive Evaluation and Robot
Control.
AD-A174 792
- *ROSENER, DANIEL E. * * *
Transport Phenomena and Interfacial
Kinetics in Multiphase Combustion
Systems.
AD-A174 828
- *ROSS, SHELDON M. * * *
Are Mass Extinctions Really
Periodic?
AD-A174 290
- *RUPPERT, DAVID * * *
Adapting for Heteroscedasticity in
Regression Models.
AD-A174 884
- *RUSSELL, DAVID L. * * *
Optimal and Insensitive Control of
Hyperbolic Distributed Parameter
Systems with Applications to Wing
Flutter Problems.
AD-A174 954
- *SAGAR, A. * * *
Dense-Spray Structure and
Phenomena.
AD-A174 883
- *SALAMI, M. R. * * *
Constitutive Modelling of Concrete
and Rocks Under Multiaxial
Compressive Loadings.
AD-A174 451
- *SAMANIEGO, F. J. * * *
Reliability Modeling and Inference
for Coherent Systems Subject to
Aging Shock and Repair.
- AD-A175 378
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AD-CO40 023 . 9 3/0

SCHAFFER (W J) ASSOCIATES INC ARLINGTON VA

(U) Short Wavelength Chemical Laser (SWCL) Technology.

DESCRIPTIVE NOTE: Final rept. Sep 84-Jul 86.

JUL 86 84P

PERSONAL AUTHORS: Watt, William S.; Hart, George A.; Zajac, Lawrence J.;

REPORT NO. WJSA-86S-VA-132

CONTRACT NO. F49620-84-C-0104

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-1070

SECRET REPORT

DECLASS ON OADR

ABSTRACT: (U) This report documents Short Wavelength Chemical Laser (SWCL) activities performed for the Air Force Office of Scientific Research (AFOSR) and the Strategic Defense Initiative Organization (SDIO). These included the organization and planning of a SWCL workshop, comparative analysis of the chemical HF and oxygen/iodine lasers for specific applications, quantification of the critical kinetic pathways in the NF-IF transfer chemical laser and evaluation of novel SWCL concepts.

DESCRIPTORS: (U) *CHEMICAL LASERS, NITROGEN, FLUORIDES, IODINE, HYDROGEN FLUORIDE LASERS, OXYGEN, IODINE, MILITARY APPLICATIONS, AIR FORCE RESEARCH, KINETICS, ENERGY TRANSFER, SHORT WAVELENGTHS, LASER BEAMS, WORKSHOPS

IDENTIFIERS: (U) PEB1102F, WY4UAFOSR2301A1

AD-CO40 023

UNCLASSIFIED

PAGE 1 EVJ56L

AD-B108 363 . 18 4/0.20 8/0

RAYTHEON CO PORTSMOUTH RI SUBMARINE SIGNAL DIV

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

DESCRIPTIVE NOTE: Annual rept. 15 Jun 85-15 Jun 86.

JUN 86 108P

PERSONAL AUTHORS: Grossi, Mario D.;

REPORT NO. 94404

CONTRACT NO. F49620-85-C-0030

PROJECT NO. 5271

TASK NO. 00

MONITOR: AFOSR
TR-86-2099

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies and their contractors; Critical Technology; 29 Dec 86. Other requests must be referred to AFOSR/XOTD, Bldg. 410, Bolling AFB, Washington, DC 22032-8448.

ABSTRACT: (U) The mechanical force sensing approach to low energy neutrino detection acquired an even greater emphasis because of the strong interest expressed by DARPA in performing a rigorous verification of Prof. Weber's claim that he has detected, at the U. of Maryland, low-energy antineutrinos, radiated by a 800 Curie tritium source, by using a room temperature torsion-balance. The engineering definition is made of a cryogenic force sensor that is expected to improve by several orders of magnitude on Prof. Weber torsion-balance's sensitivity. An area of concentration will be to identify causes, other than neutrino-induced effects, of the signal that might appear at the output of the sensors used in the tests. Some examples follow herewith. Several safeguards are planned concerning the isolation of the cryogenic force sensor against vibrations and acoustical oscillations. One is to construct the 4 k cryostat with an inner chamber evacuated of air. It is inside this chamber that the gravimetry gradiometer is installed.

AD-B108 363

UNCLASSIFIED

PAGE 1 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-B108 383 CONTINUED

hanging like a pendulum from a suspension at the top of the cryostat. The resonance frequency of the suspension will be as low as feasible, 0.1 Hz or lower, and provisions will be made to have the frequency of the signal as high as possible, possibly 100 Hz, by mechanically rotating the source. This way, the sensor will achieve a substantial attenuation of floor vibrations at the frequency of interest.

DESCRIPTORS: (U) *NEUTRINOS, *RADIATION MEASURING INSTRUMENTS, ACOUSTICS, ANTIPARTICLES, APPROACH, ATTENUATION, CHAMBERS, CORPUSCULAR RADIATION, CRYOGENICS, CRYOSTATS, DETECTION, FORCE(MECHANICS), FREQUENCY, GRADIENTMETERS, ISOLATION, LOW ENERGY, OSCILLATION, OUTPUT, RESONANT FREQUENCY, SIGNALS, VIBRATION, TORSION BARS, SENSITIVITY, MOMENTUM TRANSFER, BALANCES

IDENTIFIERS: (U) Antineutrinos

AD-B107 982L .21 1/0.21 2/0.21 4/0

ATLANTIC RESEARCH CORP ALEXANDRIA VA

(U) A Finite-Rate-Kinetics Model for Formation of Liquid Boron Oxide in a Nozzle Expansion Processes.

DESCRIPTIVE NOTE: Rept. for 15 Jan 84-28 Feb 86,

OCT 86 20P

PERSONAL AUTHORS: King, Merrill K. ;

REPORT NO. 41-5180A

CONTRACT NO. F49620-85-C-0020, F33615-85-C-2538

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-88-2093

UNCLASSIFIED REPORT

Distribution limited to DoD and DoD contractors only; Critical Technology; Sep 86. Other requests must be referred to Air Force Systems Command, AFMIL/POPR, Wright-Patterson AFB, OH 45433.

ABSTRACT: (U) An analysis model of the formation of liquid boron oxide from B2O3 gas and various gaseous H2O species (monomer, dimer, trimer) during expansion of a boron-loaded combustion product stream through a converging-diverging nozzle has been developed. Finite gas reaction kinetics, homogeneous nucleation, and deposition of gas molecules on homogeneous nuclei and heterogeneous seed particles (e.g. MgO) for subsequent particle growth are treated. Several options for growth processes are examined. It is concluded that use of simple collision theory (collisions of gas molecules with droplets yielding condensation) without consideration of thermal accommodation effects (balancing of heat transfer rate from the droplets to the gas in which they are entrained against rate of deposition of latent heat into the droplets from condensation of gaseous molecules on them) leads to non-negligible errors in predicted condensation rates (overly high rates being predicted). Parametric studies indicate that use of seed particles at

AD-B107 982L

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PAGE 2 EVJ58L

AD-B108 383

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-B107 962L CONTINUED

Practical levels and particle sizes is unlikely to dramatically improve condensation rates under realistic operating conditions. Increasing pressure or motor scale leads to limited improvements in condensation efficiency due to condensation-induced self-compensation effects.

DESCRIPTORS: (U) *COMBUSTION PRODUCTS, *REACTION KINETICS, *BORON OXIDES, BORON, COLLISIONS, CONDENSATION, CONVERGENT DIVERGENT NOZZLES, DEPOSITION, DROPS, EFFICIENCY, EXPANSION, GASES, GROWTH(GENERAL), HEAT TRANSFER, HIGH RATE, HOMOGENEITY, LATENT HEAT, LIQUIDS, MOLECULES, NUCLEATION, NUCLEI, PARAMETRIC ANALYSIS, PARTICLE SIZE, PARTICLES, RATES, THEORY, NOZZLE GAS FLOW, FUELS

IDENTIFIERS: (U) Boron hydroxides, WUAFOSR2308A1, PE61102F

AD-B107 755 . 11 4/O.11 6/O.20 11/O

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

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

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Aug 85-31 Jul 86.

JUL 86 19P

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

REPORT NO. RE-724

CONTRACT NO. F48620-84-C-0055

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-2030

UNCLASSIFIED REPORT
EXPORT CONTROL

Distribution limited to U.S. Gov't. agencies and their contractors; Critical Technology; 29 Dec 86. Other requests must be referred to AFOSR/XOTD, Bldg. 410, Bolling AFB, DC 20332-6448. This document contains export-controlled technical data.

ABSTRACT: (U) The tensile stress-strain behavior of a series of discontinuously reinforced aluminum alloy composites containing 0, 8, and 20 volume percent SiC was examined. Comparisons were made between the behavior of age-hardenable (2124) vs solution-hardened (5456) matrix alloys, whisker vs particulate forms of the SiC reinforcement, and various states of matrix precipitation. The elastic modulus and work-hardening rate of both matrix alloys increased systematically with the addition of SiC. In the solution-hardened alloy, the effects of whiskers were greater than those of particulate, while in the age-hardenable alloy, they were equivalent. In both alloys, the proportional limit of the 8% SiC composites was less than that of the unreinforced PM matrix. Increasing the SiC to 20% raised the proportional limit, but in 2124 the proportional limit of the 20% composites was still below that of the PM material. This reduction in proportional limit behavior was characteristic of all of the heat treatment conditions examined, with the

AD-B107 962L

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UNCLASSIFIED

PAGE 3 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-8107 755 CONTINUED

exception of the T8 temper, which showed a monotonic increase in the proportional limit with increased SiC content. This phenomenon is thought to be caused by the presence of mobile dislocations generated by the thermal expansion mismatch between SiC content. This phenomenon is thought to be caused by the presence of mobile dislocations generated by the thermal expansion mismatch between SiC and aluminum. The state of matrix precipitation was found to have a pronounced effect on the mechanical properties of the composite. The proportional limit of the 20% SiC/2124 composite varied from 8 ksi in the annealed condition to 95 ksi in the T8.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *METAL MATRIX COMPOSITES, *SILICON CARBIDES, *AGE HARDENING, BEHAVIOR, COMPOSITE MATERIALS, DISLOCATIONS, HEAT TREATMENT, LIMITATIONS, MATRIX MATERIALS, MECHANICAL PROPERTIES, MOBILE, MODULUS OF ELASTICITY, REINFORCING MATERIALS, STRESS STRAIN RELATIONS, TENSILE PROPERTIES, THERMAL EXPANSION, WHISKER COMPOSITES

IDENTIFIERS: (U) Aluminum Alloy 2124, Aluminum Alloy 5458, WUAFOSR2308A1, PE61102F, Export Control

AD-A176 263

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) An Improved Algorithm for Performance Analysis of Networks with Unreliable Components,

88 4P

PERSONAL AUTHORS: Lam, Y. F.; Li, Victor O.;

CONTRACT NO. AFOSR-84-0289

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2142

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Communications, vCOM-34 n5 p496-497 May 86.

ABSTRACT: (U) A new approach for analyzing the performance of communication networks with unreliable components was given in a recent paper. An algorithm was developed to generate the most probable states of a network, and an analysis of those states gave a good approximation of the network performance. This reprint presents a new algorithm for generating the most probable states. This new algorithm is a major improvement over the previous one in terms of efficiency and flexibility.

DESCRIPTORS: (U) *NETWORK ANALYSIS(MANAGEMENT), *COMMUNICATIONS NETWORKS, ALGORITHMS, PARTS, PERFORMANCE TESTS, REPRINTS, RELIABILITY(ELECTRONICS)

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-8107 755

AD-A176 263

UNCLASSIFIED

PAGE 4 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A176 193 .12 6/0

DUKE UNIV DURHAM NC

(U) On Modeling the Performance and Reliability of
Multimode Computer Systems.

MAY 86 3P

PERSONAL AUTHORS: Kulkarni, V. G.; Nicola, V. F.; Trivedi, K. S.;

CONTRACT NO. DAAG29-84-K-0045, AFOSR-84-0132

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-2007

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Systems and Software,
v8 n127 p175-182 May 86.

ABSTRACT: (U) This reprint presents an effective technique for the combined performance and reliability analysis of multimode computer systems. A reward rate (or performance level) is associated with each mode of operation. The switching between different modes is characterized by a continuous-time Markov chain. Different types of service-interruption interactions (as a result of mode switching) are considered. The authors consider the execution time of a given job on such a system and derive the distribution of its completion time. A useful dual relationship, between the completion time of a given job and the accumulated reward up to a given time is noted the use of this technique is demonstrated by means of a simple example.

DESCRIPTORS: (U) *COMPUTERS, *MULTIMODE, OPERATION, REPRINTS, TIME, MATHEMATICAL MODELS, RELIABILITY(ELECTRONICS)

IDENTIFIERS: (U) PE6110F, MJAFOSR2304K3

AD-A176 193

AD-A176 187

UNCLASSIFIED

PAGE 5

EVJ58L

AD-A176 187 .12 9/0

RENSELAER POLYTECHNIC INST TROY NY DEPT OF ELECTRICAL
COMPUTER AND SYSTEMS ENGINEERING

(U) Simply Instrumentable and Optimal Digitization of
Analog Information Sources

DESCRIPTIVE NOTE: Final rept. 30 Jun 81-31 Dec 85,
MAY 86 34P

PERSONAL AUTHORS: Pearlman, William A.;

CONTRACT NO. AFOSR-81-0188

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-86-0652

UNCLASSIFIED REPORT

ABSTRACT: (U) The research was to build on a theory of Finamore and Pearlman (1) stating that nearly optimal encoding of analog sources can be achieved with a small, finite reproduction alphabet, if that alphabet is selected properly. (Author)

DESCRIPTORS: (U) *CODING, ANALOG SYSTEMS, DIGITAL SYSTEMS, INFORMATION SYSTEMS, OPTIMIZATION, SOURCES, ALPHABETS, REPRODUCTION, IMAGE PROCESSING

IDENTIFIERS: (U) Speech processing, PE61102F, MJAFOSR2304A5

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A176 162 .6 4/0

AD-A176 123 .20 12/0

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

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS
SCIENCE AND ENGINEERING

(U) Eye Movements and Visual Information Processing.

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

DESCRIPTIVE NOTE: Final rept. 1 Jan 81-30 Jun 84.

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

MAY 86 9P

SEP 88 55P

PERSONAL AUTHORS: Kowler, Eileen ;

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

CONTRACT NO. AFOSR-84-0085

CONTRACT NO. F49620-83-C-0139

PROJECT NO. 2313

PROJECT NO. 2306

TASK NO. A5

TASK NO. B1

MONITOR: AFOSR
TR-86-0513

MONITOR: AFOSR
TR-86-1083

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Completed studies showed that: 1) saccade-
like stimulus transients (abrupt onsets or off-sets) do
not aid visual search; 2) anticipatory smooth eye
movements depend in a lawful way on the stimuli in prior
trials; 3) smooth pursuit eye movements are determined by
two, independent processes; 4) reading efficiency is not
limited by the pattern of eye movements, but rather by
the ability to recognize words quickly; 5) subjects can
maintain the line of sight on one of two, superimposed,
full-field, patterns of randomly positioned dots -- one
pattern moving and the other stationary.

DESCRIPTORS: (U) *VISUAL PERCEPTION, *EYE MOVEMENTS,
EFFICIENCY, EYE MOVEMENTS, LINE OF SIGHT, PATTERNS,
READING, SEARCHING, STIMULI, VISUAL SIGNALS, INFORMATION
PROCESSING

IDENTIFIERS: (U) PEB1102F, WUAFOSR2313A5

AD-A176 162

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *GROUP III

AD-A176 123

UNCLASSIFIED

PAGE 6

EVJ58L

ABSTRACT: (U) The investigation of defects in Gallium
Arsenide is pursued along three lines especially
important for device processing: (a) origin and control
of native midgap levels; (b) the role of vanadium in
achieving semi-insulating GaAs; and (c) feasibility of
achieving titanium doped semi-insulating III-V crystals.
By employing high resolution optical absorption and DLTS
measurements, we obtained an accurate calibration for the
determination of EL2 by optical absorption. The new
revised calibration factor is about 40% larger than the
commonly used value. Vanadium in GaAs introduces only an
acceptor level at (E sub c) -0.15 eV. Accordingly, the
vanadium level cannot be involved in compensation
mechanism responsible for semi-insulating GaAs. However,
vanadium can help to achieve SI material due to its
active role as a gettering center reducing concentration
of Si. A search for an impurity with a midgap donor level
has led to the discovery of new semi-insulating III-V
compounds based on titanium doping. For the first time
deep levels are identical due to titanium in GaAs and InP,
and the midgap location (E sub c) -0.63 eV) of the Ti
donor in InP can be used to obtain Si-InP with a
resistivity exceeding -10 million ohm-cm.

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SEARCH CONTROL NO. EVJ56L

AD-A176 123 CONTINUED

COMPOUNDS, *GROUP V COMPOUNDS, *VANADIUM, ELECTRON ACCEPTORS, CALIBRATION, ELECTRONICS, INTERACTIONS, INSULATION, ELECTRICAL RESISTANCE, COMPENSATION, PROCESSING, ABSORPTION, HIGH RESOLUTION, OPTICAL PROPERTIES, TITANIUM, DOPING

AD-A175 904 .20 4/0.20 11/0.21 5/0

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.

DESCRIPTIVE NOTE: Annual summary rept. 18 May 85-15 Jun 86.

AUG 86 114P

PERSONAL AUTHORS: Fleeter, Sanford ;

REPORT NO. NE-TSPC-TR-88-11

CONTRACT NO. F49820-83-K-0029

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-86-2113

UNCLASSIFIED REPORT

ABSTRACT: (U) The structural dynamic response of turbomachinery components to aerothermodynamic distortion induced excitations is of major concern in the design of advanced gas turbine engines. Rotor speeds at which these resonant forced responses occur can be predicted with Campbell diagrams. However, due to inadequacies of existing time-variant aerodynamic models, no accurate prediction can be made for the amplitude of the resulting vibrations and stresses. Therefore, this research program seeks to quantitatively investigate the fundamental phenomena relevant to aero thermodynamic distortion induced structural dynamic blade responses in multi-stage gas-turbine engine components. Flow physics of multi-stage blade row interactions is being experimentally investigated, with unique unsteady aerodynamic data obtained to understand, quantify, and discriminate the fundamental flow phenomena as well as to direct the modeling of advanced analyses. Data are being obtained to define both the potential and viscous flow interactions and the effect on the aerodynamic forcing function and the resulting unsteady aerodynamics of both rotor blades

AD-A176 123

AD-A175 904

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 904 CONTINUED

and stator vanes. Analytically, a first principles capability to predict the vibrational response of blading due to aerodynamic excitations is being developed. Unsteady viscous flow analyses, appropriate for aerodynamic forced response predictions, are also being developed. Recent progress includes: stationary vane row experiments in a research compressor which investigate the fundamental multi-stage blade row interaction aerodynamics; and identification and modeling of a vortex street in the instantaneous wakes of rotor blades.

DESCRIPTORS: (U) *VIBRATION, *COMPRESSOR BLADES, AERODYNAMIC CHARACTERISTICS, AERODYNAMICS, BLADES, COMPRESSORS, DYNAMIC RESPONSE, ENGINES, FLOW, GAS TURBINES, GUIDE VANES, INTERACTIONS, MODELS, PARTS, PREDICTIONS, RATES, RESONANCE, RESPONSE, ROTOR BLADES, ROTORS, STATORS, STRESSES, STRUCTURAL RESPONSE, TIME, TURBOMACHINERY, UNSTEADY FLOW, VARIATIONS, VISCOUS FLOW, WAKE, DISTORTION, AEROTHERMODYNAMICS, RESONANT FREQUENCY, TURBINE COMPONENTS, VORTICES, AERODYNAMIC FORCES, EXCITATION

IDENTIFIERS: (U) Multistage Compressors, Vortex Streets, Aerothermodynamic Distortion, PE81102F, WJAFOSR2307A4

AD-A175 376 .12 3/0.13 8/0

CALIFORNIA UNIV DAVIS INTERCOLLEGE DIV OF STATISTICS

(U) Reliability Modeling and Inference for Coherent Systems Subject to Aging Shock and Repair.

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

AUG 86 7P

PERSONAL AUTHORS: Samanlego, F. J. ;

CONTRACT NO. AFOSR-84-0159

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-2194

UNCLASSIFIED REPORT

ABSTRACT: (U) Abstracts are provided for six reports, topics include: Estimating population characteristics from record-breaking observations; Estimating a distribution function based on nomination sampling; Estimating component reliability for systems with random redundancy levels; Some multivariate lifetime distributions; Estimating the reliability of systems subject to imperfect repair; Consistent estimation of a survival curve when new is better than used in expectation.

DESCRIPTORS: (U) *RELIABILITY, AGING(MATERIALS), SHOCK, CONSISTENCY, ESTIMATES, DISTRIBUTION, MULTIVARIATE ANALYSIS, REPAIR, GRAPHS, SURVIVAL(GENERAL), COHERENCE, DISTRIBUTION FUNCTIONS, REDUNDANCY, MODELS, RELIABILITY, SAMPLING, MATHEMATICAL MODELS, ABSTRACTS, STATISTICAL ANALYSIS, STATISTICAL DISTRIBUTIONS

IDENTIFIERS: (U) WJAFOSR2304K3, PE81103F

AD-A175 904

AD-A175 376

UNCLASSIFIED

PAGE

8

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 285 .20 4/0

AD-A175 285 CONTINUED

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

CONSTRUCTION, MODELS, SHEAR PROPERTIES, PHYSICS

(U) Studies of Shear Flows.

IDENTIFIERS: (U) *Shear flow, Zonal modeling

DESCRIPTIVE NOTE: Final rept. Jan 84-Dec 85.

MAR 86 28P

PERSONAL AUTHORS: Kline, S. J.; Johnston, J. P.; Moffat, R. J.

CONTRACT NO. F48620-84-K-0004

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-86-2208

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the work reported is construction of zonal models for accurate prediction of turbulent flows in rapid-running computer programs. The work follows the ideas set down in the discussion of zonal modeling by S. J. Kline in Vol. II of the Proceedings of the 1980-81 AFOSR-Stanford Conference on Complex Turbulent Flows. This discussion noted that the fast-running models available lack sufficient span to predict all classes of turbulent flows of engineering importance in a standard, invariant form. It therefore suggested that the models be treated as zonal. In the zonal approach, the constants in the models are adjusted for each important zone of the flow, where the word zone implies a region with a particular type of flow physics. In the proposal for the work, it was also noted that the parametrization of the flows and the selection of appropriate constants would ultimately need to be guided by the domain over which accurate results could be obtained, and that might well be different from pre-conceptions embodied in conventional taxonomies of the flows.

DESCRIPTORS: (U) *TURBULENT FLOW, COMPUTER PROGRAMS, MATHEMATICAL MODELS, BOUNDARY LAYER FLOW, JET FLOW, WAKE, TURBULENT BOUNDARY LAYER, FLOW SEPARATION, MATHEMATICAL PREDICTION, TAXONOMY, PREDICTIONS, ENGINEERING, FLOW,

AD-A175 285

AD-A175 285

UNCLASSIFIED

PAGE

9

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 284 .12 3/0

COLORADO STATE UNIV FORT COLLINS

(U) Multivariable Problems of Statistical and Probability Theory.

DESCRIPTIVE NOTE: Annual rept. Apr 83-Apr 84.

APR 84 6P

PERSONAL AUTHORS: Srivastava, Jaya ;

REPORT NO. 03-2516

CONTRACT NO. AFOSR-83-0080

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2195

UNCLASSIFIED REPORT

ABSTRACT: (U) The author had three papers published, and three accepted for publication. Important advancement was made in the foundations of design theory. Difficult work (using ideal theory) was done on information matrices. The (very significant) paper on Parallel Flats Designs was revised, and so was another important paper on search decision rules. Work was also done in reliability and other fields. Keywords: Search linear models; Decision rule; Sensitivity revealing power; Coverings of affine spaces. (Author)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, THEORY, RELIABILITY, LINEARITY, MATHEMATICAL MODELS, DECISION THEORY, SEARCHING

IDENTIFIERS: (U) WJAFOSR2304A5, PE81102F

AD-A175 284

UNCLASSIFIED

AD-A175 249 .12 5/0

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) A Deductive Approach to Computer Programming.

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

88 110P

PERSONAL AUTHORS: Manna, Zohar ;

CONTRACT NO. AFOSR-81-0014

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-2184

UNCLASSIFIED REPORT

ABSTRACT: (U) This document consists of three reports: 1) TABLOG - The Deductive Tableau Programming Language; 2) The Origin of the Binary Search Paradigm; and 3) Special Relations in Automated Deduction.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, APPROACH, SEARCHING, ALGORITHMS, COMPUTER LOGIC, DERIVATIVES(MATHEMATICS)

IDENTIFIERS: (U) TABLOG Programming Language, TABLOG(Tableau Logic Programming Language), Deduction, PE81102F, WJAFOSR2304A2

AD-A175 249

PAGE 10 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 207 CONTINUED

FLOW RESEARCH CO KENT WA

(U) Development of a Device for Controlling the Leading
Edge Vortices on a Delta Wing.

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

JAN 86 86P

PERSONAL AUTHORS: Gad-el-Hak, Mohamed ;

REPORT NO. FLOW-RR-387

CONTRACT NO. F49620-85-C-0131

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-86-2126

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent experimental observations have shown that a leading edge vortex on a delta wing at constant angle of attack consists of a series of discrete smaller vortices. These vortices pair, much the same as in a free shear layer. A device is proposed to modulate the shedding and the pairing of the discrete vortices by mechanically or acoustically perturbing the leading edge of a delta wing. By applying the perturbation to both leading edges, the total lift of a wing will be altered; alternatively, by using the perturbation preferentially on only one side of the wing, the rolling moment around the axis of symmetry of the aircraft is controlled. The proposed device will enable the pilot of a fighter aircraft to achieve a previously unattained degree of maneuverability. During the first phase of this research, experiments were conducted in both a water towing tank and a high speed wind tunnel. Flow visualization, fast-response velocity probe surveys, as well as force measurements were conducted to assess the performance of the proposed vortex control device and, more importantly at this early stage of the research, to understand the complex flow field under consideration. Keywords: Vortex control device; Lift control; Lift enhancement; Super-maneuverability.

AD-A175 207

AD-A175 207

UNCLASSIFIED

PAGE

11

EVJ58L

DESCRIPTORS: (U) *DELTA WINGS, *LEADING EDGES, *VORTICES, AIRCRAFT, ANGLES, PROBES, QUICK REACTION, SURVEYS, VELOCITY, FLOW VISUALIZATION, FLOW FIELDS, MANEUVERABILITY, FIGHTER AIRCRAFT, FORCE(MECHANICS), MEASUREMENT, VORTEX SHEDDING, PERTURBATIONS, BOUNDARY LAYER CONTROL, FLIGHT MANEUVERS, AERODYNAMIC FORCES, AERODYNAMIC CONTROL SURFACES, SHEAR PROPERTIES, LEADING EDGES, LIFT, OPTIMIZATION, CONTROL SYSTEMS, MODEL BASINS, WATER TANKS, HIGH VELOCITY, WIND TUNNELS, CONTROL, LIFT, MOMENTS, ROLL, WINGS

IDENTIFIERS: (U) *Vortex control, Lift control, Supermaneuverability, PE81102F, WJAFOSR3005A1

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 195 .20 4/0

HOKENSEN (GUSTAVE J) LOS ANGELES CA

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

DESCRIPTIVE NOTE: Annual rept. Mar 88-Mar 88.

MAY 88 38P

PERSONAL AUTHORS: Hokenson, Gustave J. ;

REPORT NO. HOK-88-AF-02

CONTRACT NO. F49620-88-C-0075

MONITOR: AFOSR
TR-88-2105

UNCLASSIFIED REPORT

ABSTRACT: (U) By using a multiple-element scale/coherence decomposition of the Navier-Stokes equations, the essential characteristics of the large scale turbulent structure are computed in wall-bounded shear flows. The effect of small-scale turbulence structure is modeled and the large-scale turbulence structure is computed assuming weakly non-linear large-scale dynamics. The effects of large-scale non-linearity and the presence of wave-like elements in the flow are accounted for using perturbation theory. The resultant propagation, evolution (in the convected reference frame) and (statistical) occurrence of three-dimensional vortical instabilities are computed and compared to experimental data. Coherent structure reflective turbulence models will be constructed from this analysis.

DESCRIPTORS: (U) *TURBULENT FLOW, *VISCOUS FLOW, VARIABLE PRESSURE, SCALING FACTORS, NAVIER STOKES EQUATIONS, COHERENCE, MATHEMATICAL MODELS, DECOMPOSITION, SHEAR PROPERTIES, WALLS, VORTICES, THREE DIMENSIONAL FLOW, FLUID DYNAMICS, NONLINEAR SYSTEMS, DYNAMICS, WAVES, STRUCTURAL PROPERTIES, TURBULENCE, PERTURBATION THEORY

AD-A175 195

UNCLASSIFIED

PAGE 12

EVJ56L

AD-A175 194 .20 4/0

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Coherent Structure Modeling of Viscous Sublayer Turbulence for Incompressible Flow with Heat Transfer.

DESCRIPTIVE NOTE: Final rept..

MAY 86 149P

PERSONAL AUTHORS: Ota, Dale K. ; Chapman, Dean R. ;

REPORT NO. SUDAA-CFD-85-2

CONTRACT NO. AFOSR-82-0083

PROJECT NO. 2703

TASK NO. A2

MONITOR: AFOSR
TR-86-2104

UNCLASSIFIED REPORT

ABSTRACT: (U) A Navier-Stokes computational model of the time-development dynamics and heat transfer in a viscous sublayer had been developed. The main research objective is to determine the variation of turbulent Prandtl number across the sublayer. Experiments have been unable to define this variation, and existing theories differ greatly. The computational code uses prescribed temperature and velocity boundary conditions at the outer edge of the sublayer. Numerical computations of turbulent Prandtl number have been made for molecular Prandtl numbers ranging from 0.7 to 8 with zero pressure gradient, and for adverse, zero, and favorable pressure gradient, with a Prandtl number of 0.7. The results show a strong effect of molecular Prandtl number on turbulent Prandtl number a very near the wall; but only a relatively small effect of pressure gradient throughout the sublayer. For most practical computations of heat transfer, the simple assumption of the constant turbulent Prandtl number across the viscous sublayer appears adequate. Keywords: Fluid mechanics; Viscous sublayer; Navier-Stokes equation; Computational model.

DESCRIPTORS: (U) *INCOMPRESSIBLE FLOW, *PRANDTL NUMBER, *HEAT TRANSFER, COHERENCE, MODELS, STRUCTURAL PROPERTIES.

AD-A175 194

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 184 CONTINUED

AD-A175 132 .20 S/O

COMPUTATIONS, MATHEMATICAL MODELS, TURBULENCE, MOLECULES,
NAVIER STOKES EQUATIONS, CODING, FLUID MECHANICS,
NUMERICAL ANALYSIS, EDGES, EXTERNAL, PRESSURE GRADIENTS,
BOUNDARIES, VELOCITY, SUBSURFACE, VISCOSITY, TEMPERATURE

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Role of Surface Defects in Aluminum. Surface
Oxidation.

IDENTIFIERS: (U) PEG1102F

JUN 86 3P

PERSONAL AUTHORS: Testoni, A. L.; Stair, P. C. ;

CONTRACT NO. AFOSR-83-0302

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-86-2153

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vacuum Science and Technology
A, v4 n3 p1430-1431 May/Jun 88.

ABSTRACT: (U) The detailed Al (111) surface structure
depends upon the surface preparation. Steps, mosaics, and
facets can form depending upon the sputtering time and
the duration and temperature of annealing. In turn, the
oxidation threshold of the surface depends upon the type
and concentration of surface defects, with steps being
the most important. Low energy electron diffraction (LEED)
and Auger electron spectroscopy (AES) measurements of
oxidation kinetics were made for several Al (111)
surfaces to demonstrate the relationship between
microscopic surface structure and surface oxidation.
(Reprints).

DESCRIPTORS: (U) *ALUMINUM, *OXIDATION,
*DEFECTS(MATERIALS), ELECTRON DIFFRACTION, LOW ENERGY,
KINETICS, REPRINTS, SPUTTERING, PREPARATION, SURFACES,
ANNEALING, TEMPERATURE, AUGER ELECTRON SPECTROSCOPY,
MICROSCOPY, STRUCTURES, OXIDATION, THRESHOLD EFFECTS,
SURFACES, OXIDATION, SURFACES, STRUCTURAL PROPERTIES,
REACTION KINETICS, SURFACE CHEMISTRY

IDENTIFIERS: (U) PEG1102F, WJAFOSR2303A2

AD-A175 184

AD-A175 132

UNCLASSIFIED

PAGE 13

EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 131 20 5/O

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Effects of Surface Facets on the Oxidation of Aluminum (111) Surfaces.

86 8P

PERSONAL AUTHORS: Testoni, A. L.; Stair, P. C.;

CONTRACT NO. AFOSR-83-0302, NSF-DMR82-18972

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-86-2152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v171 pL491-L497 1986.

ABSTRACT: (U) The initial oxidation of planar and faceted aluminum (111) surfaces was studied with low energy electron diffraction (LEED) and Auger electron spectroscopy (AES). The faceted surface was produced by rapidly heating the planar (111) surface to 773 K, and consisted of (111) and (221) planes. The planar surface showed first oxide-like aluminum at 50 L; however, the faceted surface showed first oxide at less than 10 L. The results are discussed in terms of the facet plane structures. (Reprints).

DESCRIPTORS: (U) *SURFACE CHEMISTRY, *ALUMINUM, *OXIDATION, AUGER ELECTRON SPECTROSCOPY, OXIDES, OXIDATION, PLANAR STRUCTURES, SURFACES, REPRINTS, SURFACES, ELECTRON DIFFRACTION, LOW ENERGY, PLANAR STRUCTURES, CRYSTAL STRUCTURE

IDENTIFIERS: (U) LEED(Low Energy Electron Diffraction), PE81102F, WUAFOSR2303A2

AD-A175 131

UNCLASSIFIED

AD-A175 121

PAGE 14

EVJ56L

AD-A175 121 12 1/O.12 6/O

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

(U) Sparse Elimination on Vector Multiprocessors.

DESCRIPTIVE NOTE: Interim rept. 1 May 85-30 Apr 86.

APR 86 7P

PERSONAL AUTHORS: Calahan, D. A.;

CONTRACT NO. AFOSR-84-0096

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-2184

UNCLASSIFIED REPORT

ABSTRACT: (U) The availability of instruction-level simulators for the CRAY X-MP and the CRAY-2, together with early access to the MFECC and NAS CRAY-2's, has made possible the study of a variety of equation-solving issues for many-processor VMP configurations. These include: (1) the development of equation-solving algorithms on the CRAY-2, and; (2) task granularity studies; and (3) memory conflict studies.

DESCRIPTORS: (U) *SPARSE MATRIX, *MULTIPROCESSORS, ACCESS, CONFLICT, ELIMINATION, MEMORY(PSYCHOLOGY), VECTOR ANALYSIS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A2

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 113 8 4/0 AD-A175 113 CONTINUED

NEW HAMPSHIRE UNIV DURHAM VISION RESEARCH LAB

(U) Spatial and Temporal Visual Masking and Visibility.

INTERACTIONS, MAGNIFICATION, MASKING, MOTION, MOVING
TARGETS, STIMULATION(GENERAL), TRANSIENTS, VELOCITY,
VISIBILITY, VISION, VISUAL PERCEPTION, VISUAL TARGETS

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-31 Mar 86.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2313A5

JUN 86 60P

PERSONAL AUTHORS: Smith, Robert A. ;

CONTRACT NO. AFOSR-84-0348

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-2155

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies continue on spatio-temporal interactions between briefly-flashed lines. The delayed facilitation we previously reported suggested that we were tapping a motion-detector system. However extensive experiments which failed to correlate our line interactions with the motion aftereffect and other well-known manifestations of motion detection have convinced us that we are measuring something different. We currently believe we may be tapping the moving-object detectors described by Burr. We have demonstrated that transient stimulation produces a substantial change in the configuration of inhibition and excitation, as revealed by summation between briefly-flashed lines. We have extended our studies of summation between lines to parafoveal vision. Unlike most visual functions, spatial summation in the periphery does not increase in direct proportion to cortical magnification. Based on our studies of summation, we predicted and observed that aliasing, though absent in the fovea, should be present in the parafovea. Studies of velocity discrimination suggest that there do not exist a small number of discrete velocity detectors, but rather a near-continuum of these. Keywords: Visual targets; Moving targets; Visual perception.

DESCRIPTORS: (U) *VISUAL ACUITY, CONFIGURATIONS,
DETECTION, DISCRIMINATION, FOVEA, INHIBITION,

AD-A175 113

AD-A175 113

UNCLASSIFIED

PAGE 15 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A175 104

6 11/0.21 4/0

AD-A175 080 20 4/0.20 11/0.21 5/0

ILLINOIS UNIV AT URBANA DEPT OF VETERINARY BIOSCIENCES

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Based Air Force Fuels.

(U) Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 86.

DESCRIPTIVE NOTE: Annual summary rept. 16 Apr 84-15 May 85.

OCT 86 19P

PERSONAL AUTHORS: Eurrell, Thomas E. ;

JUL 85 48P

CONTRACT NO. AFOSR-84-0283

PERSONAL AUTHORS: Fleeter, Sanford ;

PROJECT NO. 2312

REPORT NO. ME-TSPC-TR-85-10

TASK NO. A5

CONTRACT NO. F49620-83-K-0028

MONITOR: AFOSR

PROJECT NO. 2307

TR-88-2177

TASK NO. A4

UNCLASSIFIED REPORT

MONITOR: AFOSR

TR-86-2163

ABSTRACT: (U) Fischer 344 male rats have a dose and time dependent proximal tubular degeneration induced by certain petroleum-based fuels. This degeneration may be associated with a low molecular weight alpha globulin (termed alpha-2U globulin). A new method was developed to obtain monospecific immunologic reagents for alpha-2U globulin using diafiltration, anion-exchange and hydroxylapatite chromatography. Rocket immunoelectrophoretic and isoelectric focusing techniques were developed to quantitatively and qualitatively assess changes in alpha-2U globulin after experimental exposure to hydrocarbon compounds. Keywords: Nephrotoxicity; Alpha-2u globulin; Rat urinary protein; Petroleum products.

DESCRIPTORS: (U) *TOXIC HAZARDS, *KIDNEYS, *BIODETERIORATION, HYDROCARBONS, TOXICITY, AIR FORCE, FUELS, PETROLEUM PRODUCTS, PROTEINS, RATS, URINE, CHEMICAL AGENTS, IMMUNOLOGY, TUBULAR STRUCTURES, EXPOSURE (PHYSIOLOGY), GLOBULINS, DOSE RATE, TIME DEPENDENCE, TUBES, FILTRATION, ION EXCHANGE, CHROMATOGRAPHY, ELECTROPHORESIS

IDENTIFIERS: (U) Nephrotoxicity, Kidney tubular degeneration, Diafiltration, Alpha-2u globulin, PE81102F, MUAFOSR2312A5

AD-A175 104

AD-A175 080

UNCLASSIFIED

PAGE 16 EVJ56L

UNCLASSIFIED REPORT

ABSTRACT: (U) The flow physics of multi-stage blade row interactions is being investigated. Unique data are being obtained to define the potential and viscous flow interactions and the effect on the aerodynamic forcing function and the unsteady aerodynamics of both rotors and stators. Analytically, a first principles capability to predict the vibrational response of blading is being developed. Also, unsteady viscous flow analyses for aerodynamic forcing response predictions are being developed. Progress during this reporting period include: vane row experiments which investigate fundamental blade row aerodynamics interactions; the identification and modeling of a vortex street structure in the instantaneous rotor wakes; preparations for rotating blade row experiments; the development and application of a locally analytic numerical method for steady viscous flows; the formulation of an unsteady incompressible viscous thin airfoil theory. Keywords: Unsteady aerodynamics, Aeroelasticity, Forced vibrations, Gas turbines, Turbomachinery.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 090 CONTINUED

DESCRIPTORS: (U) *AEROTHERMODYNAMICS, *DISTORTION, *COMPRESSOR BLADES, *VIBRATION, AIRFOILS, STRUCTURAL RESPONSE, DYNAMIC RESPONSE, POTENTIAL FLOW, COMPRESSOR ROTORS, COMPRESSOR STATORS, VORTICES, AERDELASTICITY, AERODYNAMICS, BLADES, INTERACTIONS, WAKE, BLADES, ROTATION, TURBOMACHINERY, RESPONSE, MATHEMATICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PHYSICS, GAS TURBINES, PREDICTIONS, STEADY FLOW, VISCOUS FLOW, AERODYNAMIC CHARACTERISTICS, UNSTEADY FLOW, INTERACTIONS

IDENTIFIERS: (U) Multistage compression blades, Forcing functions, Vortex streets. WUAFOSR2307A4, PE61102F

AD-A175 082 12 3/O.12 9/O

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

(U) Calculation of Cumulative Distributions and Detection Probabilities in Communications and Optics.

DESCRIPTIVE NOTE: Final rept. 1982-1986.

MAR 88 133P

PERSONAL AUTHORS: Helstrom, Carl W. ;

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2183

UNCLASSIFIED REPORT

ABSTRACT: (U) This report treats the numerical computation of cumulative distributions of random variables occurring primarily in communications, radar, and optics when their moment-generating or probability-generating functions are known. The cumulative distribution of a continuous random variable is expressed as a Laplace inversion integral of its moment-generating function, that of an integer-valued random variable as a contour integral that arises from Cauchy's theorem and whose integrand involves the probability-generating function. These integrals are evaluated by numerical quadrature along contours in the complex plane chosen for efficiency and convenience. Applications include radar detection probabilities with fading and unfading signals and fixed-threshold and constant-false-alarm-rate receivers; the distributions of the integrated output of a linear rectifier and of the filtered output of a quadratic rectifier; the error probability in a binary symmetric communication channel with intersymbol and cochannel interference; the distribution of shot noise; the distributions of the numbers of electrons emerging from photoelectric detectors, photomultipliers, and avalanche diodes; and significance probabilities in statistical rank tests.

AD-A175 090

AD-A175 082

UNCLASSIFIED

PAGE 17

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 082 CONTINUED

AD-A175 081 .12 3/0

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS.
*DETECTION, *ELECTRONS, *RECTIFIERS, *NUMERICAL METHODS
AND PROCEDURES, *RANK ORDER STATISTICS, AVALANCHE DIODES,
FILTERS, OUTPUT, INTEGRATED SYSTEMS, CHANNELS, CONTOURS,
INTEGRALS, DISTRIBUTION, SHOT NOISE, ERRORS, PROBABILITY,
LINEARITY, COMPUTATIONS, PHOTOELECTRICITY, DETECTORS,
RADAR, RANDOM VARIABLES, OPTICS, PHOTOMULTIPLIER TUBES,
STATISTICAL TESTS

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

(U) Analysis of an Identification Algorithm Arising in the
Adaptive Estimation of Markov Chains.

DEC 85 5P

PERSONAL AUTHORS: Arapostathis, Aristotle ; Marcus, Steven I.

IDENTIFIERS: (U) WJAFOSR2304A5, PEB1102F

CONTRACT NO. F49620-82-C-0033, AFOSR-84-0089

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2174

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference
on Decision and Control (24th), p208-211 Dec 85.

ABSTRACT: (U) There has recently been significant
progress in various aspects of stochastic adaptive
control. However, there are some deficiencies in this
theory: (a) in all but the case of linear systems, the
parameters estimates consists of minimum contrast or
maximum likelihood estimates, or some modification of
these, which are not necessarily easily computable in a
recursive manner; (b) aside from the case of linear
systems, virtually all of the work to date has involved
complete (noise-less) state observations. This paper,
begins to address (a) and (b) above by studying adaptive
problems with incomplete state information, in which the
state is a finite state Markov process. First consider
the problem of adaptive state estimation, which is
important both in its own right and in the context of
adaptive stochastic control. Interesting results exist
for linear discrete time and continuous time systems.
(Reprints).

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *STOCHASTIC
CONTROL, *MARKOV PROCESSES, ADAPTIVE SYSTEMS, TIME,
MAXIMUM LIKELIHOOD ESTIMATION, LINEAR SYSTEMS,
IDENTIFICATION, REPRINTS

AD-A175 082

AD-A175 081

UNCLASSIFIED

PAGE 18 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 081 CONTINUED

AD-A175 080 .12 1/O.12 9/O

IDENTIFIERS: (U) *Markov chains, WUAFDSR2304A1, PE81102F

BROWN UNIV PROVIDENCE RI

(U) Feedback Stabilization of State Delayed Systems via a Reducing Transformation,

DEC 85 3P

PERSONAL AUTHORS: Flagbedzi, Y. A.; Pearson, A. E.;

CONTRACT NO. AFDSR-85-0300, NSF-ECS81-11219

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFDSR
TR-86-2172

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Conference on Decision and Control (24th), p128-129 Dec 85.

ABSTRACT: (U) A reducing transformation is devised for class of state delayed differential systems. The reduced system facilitates the design of feedback stabilizing controls based on delay free control techniques. (Reprints).

DESCRIPTORS: (U) *CONTROL, *FEEDBACK, *STABILIZATION, DELAY, REPRINTS, REDUCTION

IDENTIFIERS: (U) WUAFDSR2304A1, PE81102F,

AD-A175 081

AD-A175 080

UNCLASSIFIED

PAGE 19

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 076

.12 B/O.12 B/O

AD-A175 076 CONTINUED

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Fast Algorithms for Structural Analysis, Least Squares and Related Computations.

DESCRIPTIVE NOTE: Annual interim rept. 15 Jul 85-14 Jul 86.

AUG 86 10P

PERSONAL AUTHORS: Plemmons, Robert J. ;

CONTRACT NO. AFOSR-83-0255

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-86-2131

UNCLASSIFIED REPORT

ABSTRACT: (U) New fast algorithms for high speed computation on the modern generation of supercomputers is essential. To meet these challenges new techniques are developed in numerical linear algebra and its applications for implementation on these new architectures. Significantly, applications of this work to practical problems of structural analysis and design and to least squares adjustments, estimation and digital filtering are also being investigated. The current objectives in structural analysis are to develop efficient and stable high speed algorithms for the design and analysis of large complex systems. Interest here is in developing stable alternatives to the often ill conditioned stiffness matrix approach to solving problems in elastic analysis and structural dynamics. For example, a comparative study is developed of the performances of seven alternative methods to the stiffness approach on the Alliant FX/8 and Cray X-MP systems. These methods involve various orthogonal factorization approaches as well as preconditioned conjugate gradient methods which completely avoid formation of the stiffness equations.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *ALGORITHMS, *COMPUTER ARCHITECTURE, COMPUTATIONS, ELASTIC PROPERTIES, HIGH RATE, LINEAR ALGEBRA, NUMERICAL ANALYSIS, PROBLEM

AD-A175 076

AD-A175 076

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PAGE 20

EVJ56L

SOLVING, APPROACH, STIFFNESS, DIGITAL FILTERS, LEAST SQUARES METHOD, STRUCTURAL ANALYSIS, STABILITY, EQUATIONS, DATA RATE, PARALLEL PROCESSING, SUPERCOMPUTERS

IDENTIFIERS: (U) CRAY X-MP computers, CRAY 2 computers, ALLIANT FX/8 computers, Conjugate gradient method, WUAFOSR2304A8, PE81102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 075 .12 2/O.25 3/O

CLEMSON UNIV SC

(U) Algebraic and Computational Aspects of Network Reliability and Problems.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 85-14 Jun 86.

JUL 86 5P

PERSONAL AUTHORS: Shier, Douglas ;

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-2115

UNCLASSIFIED REPORT

ABSTRACT: (U) It is important to be able to assess the reliability of a complex system in terms of the reliabilities of its components. This type of problem arises with increasing frequency in the analysis of telecommunication and distribution systems, which can be represented as networks. The present research employs an underlying algebraic structure to study network reliability problems and to develop new algorithms for their solution. Iterative techniques for calculating reliability (both exactly and approximately) have been developed for both general networks and a difficult class of specialized networks. These techniques allow the solution of fairly complex networks, ones that have previously resisted analysis. In addition, the underlying structure of network reliability problems has been approached by studying the combinatorial properties of a certain polynomial defined with respect to the underlying graph topology.

DESCRIPTORS: (U) *ALGEBRA, *NETWORK ANALYSIS(MANAGEMENT), RELIABILITY(ELECTRONICS), ALGORITHMS, COMBINATORIAL ANALYSIS, GRAPHS, ITERATIONS, NETWORKS, POLYNOMIALS, TELECOMMUNICATIONS, TOPOLOGY

IDENTIFIERS: (U) WJAFOSR2304K3, PE61103F

AD-A175 075

UNCLASSIFIED

AD-A175 073

PAGE 21 EVJ56L

AD-A175 073 .12 2/O.20 9/O

CLARKSON UNIV POTSDAM NY DEPT OF MATHEMATICS AND COMPUTER SCIENCE

(U) Nonlinear Wave Propagation.

DESCRIPTIVE NOTE: Progress rept. 1 Oct 85-28 Apr 86.

APR 86 4P

PERSONAL AUTHORS: Ablowitz, Mark J. ;

CONTRACT NO. AFOSR-84-0005

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-86-2192

UNCLASSIFIED REPORT

ABSTRACT: (U) The central theme involved in this work is the continuing study of certain fundamental features associated with the nonlinear wave propagation arising in and motivated by physical problems. The usefulness of the work is attested to by the varied applications, and wide areas of interest in physics, engineering and mathematics. The work accomplished involves wave propagation in a number of areas including fluid mechanics, plasma physics, theoretical physics, statistical mechanics, nonlinear optics, multidimensional solitons, multidimensional inverse problems, Painleve equations, direct linearizations of certain nonlinear wave equations, DBAR problems, Riemann-Hilbert boundary value problems, differential geometry, etc.

DESCRIPTORS: (U) *NONLINEAR PROPAGATION ANALYSIS, *PLASMAS(PHYSICS), *STATISTICAL MECHANICS, DIFFERENTIAL GEOMETRY, EQUATIONS, FLUID MECHANICS, INVERSION, NONLINEAR SYSTEMS, OPTICS, PHYSICS, WAVE PROPAGATION, WAVES

IDENTIFIERS: (U) WJAFOSR2304A4, PE61102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 072 12 2/0.20 4/0 AD-A175 072 CONTINUED

PEDA CORP PALO ALTO CA

(U) Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.

DESCRIPTIVE NOTE: Final rept. 18 May 83-14 May 85.

AUG 86 SSP

PERSONAL AUTHORS: Lombard, Charles K.; Venkatapathy, Ethiraj; Bardina, Jorge; Nagaraj, N.;

CONTRACT NO. F49620-83-C-0084

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-88-2118

UNCLASSIFIED REPORT

ABSTRACT: (U) This research sought to provide computational tools and procedures as the building blocks for a system to permit efficient solution and high resolution capture of flow structure in gasdynamic problems of realistically complex geometries. The research yielded a comparatively simple algebraic procedure for constructing two and three dimensional geometry fitted base level composite meshes in quadrilateral patches. The method provides complete control of coordinate distribution and gradient on all patch boundaries which may include slope discontinuities. A robust upwind implicit method (CSCM) was the basis to solve the multidimensional pseudo time dependent Euler or compressible Navier-Stokes equations. Research into solution algorithms for that upwind method yielded a more robust diagonally dominant (DDADI) approximate factorization that subsequently led to a family of rapidly convergent and data storage and management efficient relaxation schemes in two and three space dimensions. These operationally explicit and unconditionally stable upwind algorithms have led to a simple robust boundary procedure based on interpolation of conservative variable data from adjacent patches overlying interior patch boundaries where coordinates are discontinuous.

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AD-A175 072

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PAGE 22

EVJ56L

DESCRIPTORS: (U) GAS DYNAMICS, AERODYNAMICS, ALGORITHMS, BOUNDARIES, COMPRESSIBLE FLOW, COMPUTATIONS, CONTROL, CONVERGENCE, COORDINATES, DATA STORAGE SYSTEMS, DISCONTINUITIES, DISTRIBUTION, FLOW, GEOMETRY, INTERNAL, INTERPOLATION, MESH, MODULAR CONSTRUCTION, NAVIER STOKES EQUATIONS, SIMULATION, SLOPE, SOLUTIONS(GENERAL), THREE DIMENSIONAL, TWO DIMENSIONAL, VARIABLES, GRIDS, RELAXATION, GRADIENTS, TIME DEPENDENCE, APPROXIMATION(MATHEMATICS), DATA MANAGEMENT

IDENTIFIERS: (U) Upwind method, Algebraic grid generation, Approximate factorization, HUAFO8R2304A3, PEG1102F

UNCLASSIFIED

AD-A175 071 20 4/0.21 2/0 OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 071 CONTINUED

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL
LABS

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Annual rept. Apr 85-Apr 86.

JUN 86 117P

PERSONAL AUTHORS: Dimotakis, P. E.; Broadwell, J. E.;
Leonard, A.;

CONTRACT NO. AFOSR-83-0213

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2123

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is continuing primarily in gas phase turbulent mixing and chemical reactions. The liquid phase work to date is in its final stages of being analyzed and documented for dissemination in the form of archival publications. In the gas phase shear layer work, investigations are concentrating on shear layer free stream density ratio effects, finite kinetic rate (Damkohler number) effects, and a design effort in support of the planned extension of the work to supersonic flows. In jet flows, progress has been made in the gas phase laser Rayleigh scattering techniques developed for conserved scalar measurements down to diffusion space and time scales. A new technique has been developed under joint support with the Gas Research Institute that permits the imaging of soot sheets in turbulent flames and is being used to describe the combustion flame sheets in methane flames. Theoretical work in progress is addressing the finite chemical rate problem as well as the diffusion-limited shear layer mixing problem. Advances in our data acquisition capabilities during the last year are permitting higher temporal resolution measurements to be taken with digital image arrays.

DESCRIPTORS: (U) *COMBUSTION, *GAS FLOW, ARCHIVES.

AD-A175 071

AD-A175 071

UNCLASSIFIED

PAGE 23

EVJ56L

ARRAYS, CHEMICAL REACTIONS, DATA ACQUISITION, DIGITAL SYSTEMS, DOCUMENTS, FLAMES, GASES, IMAGES, JET FLOW, LIQUID PHASES, MEASUREMENT, METHANE, MIXING, SCALAR FUNCTIONS, SCALE, SHEETS, SOOT, SUPERSONIC FLOW, THEORY, TIME, TURBULENT FLOW, WORK, SHEAR PROPERTIES, RAYLEIGH SCATTERING, LASER APPLICATIONS, REACTION KINETICS, DIFFUSION

IDENTIFIERS: (U) Turbulent mixing flow, Shear flow, Damkohler number, WJAFOSR2308A2, PE61102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 070 20 4/0

AD-A175 080 12 3/0

GRUBMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Study of Separation and Vortices in Rotational Inviscid Flows.

(U) Non-Orthogonal Designs for Measuring Dispersion.

DESCRIPTIVE NOTE: Annual rept. Jul 85-Jun 86.

DESCRIPTIVE NOTE: Interim rept. Jul-Sep 86.

OCT 86 19P

SEP 86 18P

PERSONAL AUTHORS: Marconi, Frank ;

PERSONAL AUTHORS: Ghosh, Subir ;

REPORT NO. RE-727

REPORT NO. TR-148

CONTRACT NO. F49620-85-C-0115

CONTRACT NO. AFOSR-86-0048

PROJECT NO. 2307

PROJECT NO. 2304

TASK NO. C1

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-86-2110

TR-86-2130

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the power of the Euler equations in the prediction of supersonic separated flows is presented. These equations are solved numerically for the highly vortical flow about simple bodies. Two sources of vorticity are studied: the first is the flow field shock system and the second is the vorticity shed into the flow field from a separating boundary layer. Both sources of vorticity are found to produce separation and vortices. In the case of shed vorticity the surface point from which the vorticity is shed (i.e., separation point) is determined empirically. Solutions obtained with both sources of vorticity are studied in detail, compared with each other, and with potential calculations and experimental data. Keywords: Fluid mechanics; Vortex flows; Supersonic flows.

ABSTRACT: (U) Dispersion effects are considered in addition to Location effects of factors in the inferential procedure of sequential factor screening experiments with m factors each at two levels under search linear models. Search designs in measuring Dispersion and Location effects of factors are presented for both stage one and stage two of factor screening experiments with $4 < m < 10$.

DESCRIPTORS: (U) *VORTEX SHEDDING, *INVISCID FLOW, *FLOW SEPARATION, *SUPERSONIC FLOW, *VORTICES, FLOW, BOUNDARY LAYER, EQUATIONS, FLOW FIELDS, FLUID MECHANICS, ROTATION, SURFACES, DIFFERENTIAL EQUATIONS, SHOCK TESTS, COMPUTATIONS, SEPARATION, SOURCES

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *DISPERSION RELATIONS, *SEQUENTIAL ANALYSIS, FACTOR ANALYSIS, ORTHOGONALITY, LINEARITY, MATHEMATICAL MODELS, SEARCHING

IDENTIFIERS: (U) *Vortex flow, WUAFOSR2307C1, PE61102F

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A175 070

AD-A175 080

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PAGE 24 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L

AD-A175 059 .20 8/0

MINNESOTA UNIV MINNEAPOLIS

(U) Structure from Motion.

DESCRIPTIVE NOTE: Final rept. Jul 83-30 Sep 85.

DEC 85 53P

PERSONAL AUTHORS: Thompson, William B. ;

CONTRACT NO. F49620-83-C-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2132

UNCLASSIFIED REPORT

ABSTRACT: (U) Work on improving gradient-based methods for optical flow estimation has been completed. An understanding of how errors arise makes it possible to define the inherent limitations of the gradient-based technique, obtain estimates of the accuracy of computed values, enhance the performance of the technique, and demonstrate the informative value of some types of errors. Significant results have been achieved on the problems associated with motion-based segmentation. An approach based on understanding the three-dimensional scene structure leading to an edge in optical flow has been developed. As a result, it is possible to simultaneously detect edges and determine important three-dimensional properties of the associated scene surfaces. The methods which have been developed make it possible to distinguish between occluding and occluded surfaces at a boundary. This technique may make it possible to link image regions corresponding to a partially occluded object and to produce descriptions of object boundaries that are less affected by occlusion. In addition, being able to distinguish between occluding and occluded boundaries is a crucial step towards determining the three-dimensional position of surfaces. Keywords: image understanding, visual motion.

DESCRIPTORS: (U) *OPTICAL PROCESSING, *OPTICAL IMAGES, ACCURACY, BOUNDARIES, ESTIMATES, FLOW, MOTION, STRUCTURES.

AD-A175 059

AD-A175 059

UNCLASSIFIED

PAGE 25

EVJ86L

THREE DIMENSIONAL, VISION, SEGMENTED

IDENTIFIERS: (U) Image understanding, PES1102F,
WJAFDSR2304AS

AD-A175 059 CONTINUED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ86L

AD-A175 058 12 3/0

AD-A175 058 CONTINUED

HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

REDUCTION, RICCATI EQUATION, SOLUTIONS (GENERAL),
SYNTHESIS, TIME, TOOLS, VALUE, MATHEMATICAL MODELS

(U) Robust Control of Multivariable and Large Scale
Systems.

IDENTIFIERS: (U) PEG1102F, MUAFOSR2304A1

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

MAR 86 185P

PERSONAL AUTHORS: Doyle, John C.; Chu, Cheng C.;

CONTRACT NO. F49620-84-C-0068

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2173

UNCLASSIFIED REPORT

ABSTRACT: (U) New methods are presented for analysis and synthesis of control systems subject to structured uncertainties. The technical approach involves the structured singular value, as an analysis tool and H infinity as a synthesis tool. Alternative formulations are compared with the H infinity approach, extensions of mu to handle real parameter problems are presented, and the issue of the convergence of mu synthesis to a global optimum is studied. A comprehensive solution for the synthesis of general optimal controllers is given for linear lumped time-invariant systems. The existence of an optimal solution for H infinity optimization is proved, and some properties of this solution are discovered. The method called Euler's constant iteration is presented and its convergence properties are established. A new algorithm for solving a class of algebraic riccati equations is obtained. Explicit error bounds for model reduction in the synthesis process are derived. The constructions use standard matrix operations and linear algebra applied to state-space representations of linear systems.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *MULTIVARIATE ANALYSIS, ALGORITHMS, CONSTANTS, CONTROL, CONVERGENCE, EULER ANGLES, INVARIANCE, ITERATIONS, LINEAR ALGEBRA, LINEAR SYSTEMS, METHODOLOGY, OPTIMIZATION, PARAMETERS.

AD-A175 058

AD-A175 058

UNCLASSIFIED

PAGE 26

EVJ56L

UNCLASSIFIED

AD-A175 066 12 2/0 20 4/0 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L
AD-A175 066 CONTINUED

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Three-Dimensional Viscous Flow Solutions with a
Vorticity - Stream Function Formulation.

DESCRIPTIVE NOTE: Final rept. for period ending 1 Mar 84.

MAY 86 125P

PERSONAL AUTHORS: Davis, R. L.; Carter, J. E.; Hafez, M.;

CONTRACT NO. F49620-84-C-0032

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2133

UNCLASSIFIED REPORT

ABSTRACT: (U) A three-dimensional streamlike function/vorticity transport procedure has been developed to analyze two- and three-dimensional inviscid and viscous flows. Both the formulation and the numerical techniques used to solve these equations contain many of the advantages of interacting boundary layer theory for strongly interacting viscous and inviscid flows. An algorithm which involves the solution of two uncoupled Poisson/vorticity transport equation sets is described. An implicit line relaxation scheme is used to solve a 2 x 2 block-tridiagonal system for the Poisson and vorticity transport equations in each of the x- and z-directions. Solutions for 2-D and 3-D inviscid and viscous flows are compared with other numerical solutions demonstrating the stability and accuracy of the current procedure. Favorable agreement with the recently obtained 3-D interacting boundary layer solutions of Edwards demonstrates the overall accuracy of this new approach for 3-D viscous flows including flow separation. This streamlike function/vorticity transport procedure has been found to yield smooth solutions without the need to add explicit artificial viscosity. Keywords: stream function; finite difference coefficients; Navier Stokes equations.

DESCRIPTORS: (U) *INVISCID FLOW. *THREE DIMENSIONAL FLOW.

AD-A175 056

AD-A175 056

UNCLASSIFIED

PAGE 27

EVJ56L

*VISCOUS FLOW. *VORTICES, ACCURACY, VISCOSITY, FLOW SEPARATION, FLOW, INTERACTIONS, RELAXATION, NUMERICAL ANALYSIS, SOLUTIONS(GENERAL), FUNCTIONS(MATHEMATICS), ALGORITHMS, BOUNDARY LAYER, THEORY, NAVIER STOKES EQUATIONS, NUMERICAL METHODS AND PROCEDURES, FORMULATIONS, TWO DIMENSIONAL FLOW, POISSON EQUATION, FINITE DIFFERENCE THEORY, COEFFICIENTS, VORTICES, EQUATIONS, TRANSPORT PROPERTIES

IDENTIFIERS: (U) Stream functions, MUAFOSR2307A1, PEB1102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A176 086 12 6/0

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) On the Analysis of Synchronous Computing Arrays.

86 82P

PERSONAL AUTHORS: Jover, J. M.; Kallath, T.; Lev-Ari, M.;
Ree, S. K.

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

PROJECT NO 2304

TASK NO. A6

MONITOR: AFOSR
TR-86-2171

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contracts N00039-84-C-0211 and N00014-88-K-0812.

ABSTRACT: (U) This paper is concerned with the analysis of synchronous, special purpose, multiple-processor systems, including, e.g., systolic arrays. There have been some results on this problem, especially by Mahesh and Rheinboldt. Our approach is different, combining ideas well known in linear system theory with certain graph-theoretical concepts from computer science. A by-product of our approach to the analysis program is a rigorous characterization of the notion of equivalence between iterative algorithms.

DESCRIPTORS: (U) *COMPUTERS, *COMPUTER ARCHITECTURE, ALGORITHMS, ITERATIONS, LINEAR SYSTEMS, THEORY

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A6

AD-A175 085

UNCLASSIFIED

AD-A175 083 12 1/0 13 8/0

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) A Survey of Network Reliability Modeling and Calculations.

OCT 86 7P

PERSONAL AUTHORS: Lam, Y. F.; Li, Victor O.

CONTRACT NO AFOSR-84-0269

PROJECT NO 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2141

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of IEEE MILCOM, pt-4 Oct 86.

ABSTRACT: (U) A brief survey of the subject of network reliability is presented. Network reliability is the study of network performance when components of the network are subject to failures. The problem can be divided into two main parts: the modeling of component failures, the assumption that component failures are statistically independent is often made to simplify the problem. But this assumption is unrealistic in most real-world situations. In this survey, special attention is given to recent developments in modeling statistically dependent failures of network components. For reliability calculations, only analytical techniques are considered, and simulations are excluded. A brief classification of existing techniques is given. Since most network reliability problems are NP-hard, exact techniques to calculate network reliability can only handle problems of limited sizes, and therefore approximate techniques are of practical importance. Both exact and approximate techniques are covered in this survey.

DESCRIPTORS: (U) *FAILURE (MECHANICS), *MODELS, *COMPUTATIONS, *RELIABILITY, PARTS, LIMITATIONS, SIZES (DIMENSIONS), NETWORKS

AD-A175 083

PAGE 28 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 063 CONTINUED

AD-A175 062 7 4/0

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A5

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Isomers of Si2 C2: An MBPT Study.

88 7P

PERSONAL AUTHORS: Trucks, Gary W.; Bartlett, Rodney J.;

CONTRACT NO. AFOSR-88-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-88-2154

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure
(Theochem) V138 p423-428 1986.

ABSTRACT: (U) The structure of the low-lying electronic states of the unknown Si2C2 system is studied using full fourth-order Many Body Perturbation Theory (MBPT). It is concluded that the lowest-lying structure is a rhombus, superscript 1 A sub g state, which is ca. 12 kcal/mol lower than the linear superscript 3 sigma g (-) state. This is similar to the C4 system. The rhombus structure accommodates reluctance of silicon to form stable multiple bonds. Vibrational frequencies are reported.

DESCRIPTORS: (U) *ELECTRONIC STATES, *SILICON CARBIDES, ELECTROMAGNETIC PROPERTIES, FREQUENCY, LOW LEVEL, PERTURBATION THEORY, RHOMBUS, VIBRATION, N BODY PROBLEM, COVALENT BONDS, CRYSTAL STRUCTURE, REPRINTS

IDENTIFIERS: (U) PEG1102F, WJAFOSR2301A4

AD-A175 063

AD-A175 052

UNCLASSIFIED

PAGE 29 EVJ56L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 061 9 1/0.12 8/0

AD-A175 049 20 8/0

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR COMPUTER SCIENCE

MICHIGAN UNIV ANN ARBOR DEPT OF NUCLEAR ENGINEERING

(U) Theoretical Aspects of VLSI (Very Large Scale Integration) Circuit Design.

(U) Interaction of Charged Particle Beams with Pre-Ionized Channels.

DESCRIPTIVE NOTE: Annual rept. Sep 83-Jan 86.

DESCRIPTIVE NOTE: Final rept. 30 Sep 82-28 Sep 85.

JAN 86 10P

SEP 85 13P

PERSONAL AUTHORS: Leighton, F. T. ;

PERSONAL AUTHORS: Kamash, T. ; Lee, J. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-82-0339

TASK NO. A2

PROJECT NO. 2301

MONITOR: AFOSR

TR-86-2168

MONITOR: AFOSR

TR-86-2179

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by the grant, two books and ten research papers were written under grant sponsorship. In addition nineteen of the research papers were written and published in conference proceedings. Ten other research manuscripts are now nearing completion. Titles of some of the completed work include: EIGENVALUES AND EXPANDERS, A FRAMEWORK OF SOLVING VLSI GRAPH LAYOUT PROBLEMS, TIGHT BOUNDS ON THE COMPLEXITY OF PARALLEL SORTING, WAFER-SCALE INTERGRATION OF SYSTOLIC ARRAYS, and THE AVERAGE CASE ANALYSIS OF SOME ON-LINE ALGORITHMS FOR BIN PACKING.

DESCRIPTORS: (U) *CIRCUITS, *COMPUTER ARCHITECTURE, *INTEGRATION, ALGORITHMS, LINE SYSTEMS, PARALLEL ORIENTATION, SORTING, DOCUMENTS, BOOKS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A2

ABSTRACT: (U) A Monte Carlo Fokker Planck Code is used to investigate the scattering loss of particles from a relativistic electron beam propagating in a low pressure air channel. Two special cases are examined. The first corresponds to an experiment in which a one cm radius, 90 KeV beam propagates in hydrogen channel of the same radius, 50 cm long with a density of 10 cm an da temperature of 0.5 eV assuming the interaction to take place only with the charged particles of the medium. It is shown that the beam will traverse such channel if the ionization drop s below 20% noting that for such parameters the channel pressure corresponds to few tens of millitons. The second case corresponds to what is referred to as the Ion Focused Regime where the pressure is about 0.1 torr. Scattering of beam particles by both neutral and charged particles is taken into account in this case as well as multiple scattering form neutral targets. It is shown that transmitted fraction is linearly proportional to the square of the channel radius, and the probability of multiple scattering increases with increasing channel radius.

DESCRIPTORS: (U) *ELECTRON SCATTERING, *ELECTRON BEAMS, CHANNELS, PRESSURE, CHARGED PARTICLES, PARTICLE BEAMS, LOW ALTITUDE, LOW PRESSURE, NEUTRAL, TARGETS, IONIZATION, RADIUS(MEASURE), HYDROGEN, LOSSES, SCATTERING, FOKKER

AD-A175 051

AD-A175 049

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PAGE 30 EVJ56L

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Fifth-Order Many-Body Perturbation Theory and its Relationship to Various Coupled-Cluster Approaches.

86 64P

PERSONAL AUTHORS: Kucharski, Stanislaw A. ; Bartlett, Rodney J. ;

CONTRACT NO. AFDSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFDSR
TR-88-2118

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Quantum Chemistry,
v18 p281-344 1986.

ABSTRACT: (U) An analysis has been made of fifth order many body perturbation theory and its relationship to various coupled cluster approaches. The results show that the calculation of the fifth order energy is feasible and when carefully implemented may be applied to moderate sized systems. The number of terms that must be considered may be substantially reduced by taking into account the fact that many of the diagrams have identical values and many are amenable to factorization. (Reprints).

DESCRIPTORS: (U) *CLUSTERING, *N BODY PROBLEM,
*PERTURBATION THEORY, BODIES, REPRINTS, ENERGY, QUANTUM THEORY

IDENTIFIERS: (U) Rayleigh schroedinger theory, PE61102F,
WUAFOSR2301A4

AD-A175 049

AD-A175 047

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PAGE 31

EVJ56L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

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PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Fuels Combustion Reseaearch.

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

OCT 86 62P

PERSONAL AUTHORS: Dryer, F. L. ; Glassman, I. ; Williams, F. A.

CONTRACT NO. F49620-86-C-0006

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2107

UNCLASSIFIED REPORT

ABSTRACT: (U) After great progress related to soot formation in normal diffusion flames, studies of near sooting inverse diffusion flames were begun to determine controlling precursors. Stable, temperature controlled inverse diffusion flames have been successfully developed and numerous chemical samples extracted and analyzed. Observed trends are being studied. The side chain oxidation of n-butyl benzene was found to follow the same processes as the smaller n-alkyl benzenes; abstraction, alkyl group displacement and thermal cleavage. The results have led to development of a simple general, mechanistic model for the oxidation of n-alkyl benzenes. Combustion property observations of isolated boron droplets were extended to boron/JP-10 slurries with various solid loadings. Some physical understanding of observed droplet-burning and disruption behavior was developed. Quasi-spherical hollow shells of the boron agglomerate with blowholes support the hypothesis of the formation of the impermeable shell and subsequent disruption of the primary slurry droplet. Boron suspension (cloud) combustion in the hot reaction products of a flat-flame burner has been pursued. The boric acid fluctuation bands were identified spectroscopically, and conditions for their flame

AD-A175 040

AD-A175 040

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PAGE 32

EVJ58L

occurrence measured. The work progresses toward establishment of ignition conditions and combustion times of 0.1-5 micron boron particles.

DESCRIPTORS: (U) *SLURRY FUELS, *COMBUSTION, *BORON, *BENZENE COMPOUNDS, *SOOT, PERMEABILITY, AGGLOMERATES, SHELLS(STRUCTURAL FORMS), DROPS, SLURRIES, DROPS, ISOLATION, CHAINS, OXIDATION, SIDES, CLEAVAGE, THERMAL PROPERTIES, ALKYL RADICALS, DISPLACEMENT, CHEMICALS, SAMPLING, OBSERVATION, FUELS, HYPOTHESES, BORIC ACID, VARIATIONS, HEAT OF REACTION, REACTANTS(CHEMISTRY), IGNITION, BAND SPECTRA, COLLOIDS, CLOUDS, PRECURSORS, JET ENGINE FUELS, DIFFUSION

IDENTIFIERS: (U) Soot formation, Aromatic fuel oxidation, Boron slurry combustion, Boron cloud combustion, Diffusion flames, JP-10 fuel, PE81102F, WJAFDSR2308A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 035 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On Stationarity of the Solution of a Doubly Stochastic Model.

86 11P

PERSONAL AUTHORS: Pourahmadi, Mohsen ;

REPORT NO. TR-81

CONTRACT NO. F49620-85-C-0144, NSF-MCS83-01240

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2143

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Time Series Analysis,
v7 n2 p123-131 1986.

ABSTRACT: (U) This document considers the discrete parameter process $(x \text{ sub } t)$ satisfying the doubly stochastic model $(X \text{ sub } T)$ satisfying the doubly stochastic model $X \text{ sub } T = \phi \text{ sub } t \text{ sub } T - 1 \text{ t epsilon sub } t$, where $(\phi \text{ sub } t)$ and $(\epsilon \text{ sub } t)$ are also stochastic processes. Necessary and sufficient conditions on $(\phi \text{ sub } t)$ are given for $(x \text{ sub } t)$ to be a second order process. When $(x \text{ sub } t)$ is a strictly stationary process, some sufficient conditions in terms of $(x \text{ sub } t)$ are given which guarantee the wide sense stationarity of $(x \text{ sub } t)$. It turns out that for these problems the distribution and dependence structure of the process $(\log / \phi \text{ sub } t)$ play an important role. Keywords: Stochastic models.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *STOCHASTIC PROCESSES, PARAMETERS, STATIONARY

IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F

AD-A175 035

UNCLASSIFIED

AD-A175 034

PAGE 33

EVJ56L

AD-A175 034 .5 3/0

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Replacement with Non-Constant Operating Cost.

86 57P

PERSONAL AUTHORS: Anderson, R. F. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2144

UNCLASSIFIED REPORT

ABSTRACT: (U) The long run average cost problem is considered in the case of a non-decreasing Markov wear process with failure determined by a random threshold. The method of analysis is to first consider the discounted problem and then let the discount factor go to zero.

DESCRIPTORS: (U) *COST ANALYSIS, COSTS, THRESHOLD EFFECTS, STOCHASTIC CONTROL, MARKOV PROCESSES, WEAR, REPLACEMENT, OPTIMIZATION

IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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AD-A175 033 CONTINUED

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERINGcharacteristics: flow physics and modeling; Supersonic
characteristics.(U) The Study of Shock Wave and Turbulent Boundary Layer
Interactions.DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *SHOCK WAVES,
INTERACTIONS, FLOW, PHYSICS, FLOW FIELDS, SCALING FACTORS,
GENERATORS, BOUNDARIES, CONICAL BODIES, CYLINDRICAL
BODIES, HIGH RESOLUTION, SURVEYS, DATA BASES, TEST AND
EVALUATION, PRESSURE MEASUREMENT, FINS, WEDGES, HIGH
FREQUENCY, PRESSURE DISTRIBUTION, STATIC PRESSURE
BOUNDARY LAYER, THICKNESS, THREE DIMENSIONAL, SUPERSONIC
CHARACTERISTICS, FLOW VISUALIZATION, SURFACES, UNSTEADY
FLOW, YAW

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-31 Jul 86.

NOV 86 43P

PERSONAL AUTHORS: Bogdonoff, Seymour M. ;

REPORT NO. 1767-MAE

CONTRACT NO. F49620-84-C-0086

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2175IDENTIFIERS: (U) Surface pressure, Conical similarity,
Nonsteady characteristics, WUAFDSR2307A1, PE81102F

UNCLASSIFIED REPORT

ABSTRACT: (U) The three dimensional shock wave turbulent boundary layer interaction generated by several shock generators defined solely by angles has been carried out at a Mach number of 3. Interactions with thin boundary layers were used to obtain overall characteristics, while interactions with thick boundary layers permitted detailed high resolution surveys. Investigations of the surface pressure distribution measurements, surface flow visualization, and mean total head, yaw, and static pressure distributions through the flowfield. Major new data sets were obtained for the interaction of the shock wave generated by a 20 deg fin, and by a 24 deg wedge swept at 60 deg to the incoming flow. A series of tests were carried out to examine new concepts of three-dimensional interactions and extensive 'non-steady' results were obtained from the high frequency surface pressure distributions. Close coordination of the experiments with major computational efforts, support new concepts of flow structure and physics for these complex interactions. Keywords: Three-dimensional shock wave interactions; Conical similarity; Scaling laws; Conical/cylindrical boundary; Unsteady flow; Non-steady

AD-A175 033

AD-A175 033

UNCLASSIFIED

PAGE 34 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 031

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MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE

(U) System Structure Analysis: Clustering with Data Bindings.

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

AUG 85 10P

DESCRIPTIVE NOTE: Annual technical rept. no. 1, May 85-May 86.

PERSONAL AUTHORS: Hutchens, David H. ; Basili, Victor R. ;

NOV 88 109P

CONTRACT NO. F49620-80-C-0001

PERSONAL AUTHORS: Fraser, Hamish L. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-85-0191

TASK NO. A3

PROJECT NO. 2308

MONITOR: AFOSR TR-86-2159

TASK NO. A1

UNCLASSIFIED REPORT

MONITOR: AFOSR TR-86-2114

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Software Engineering, VSE-11 n8 p749-757 Aug 85.

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper examines the use of cluster analysis as a tool for system modularization. Several clustering techniques are discussed and used on two medium-size systems and a group of small projects. The small projects are presented because they provide examples (that will fit into a paper) of certain types of phenomena. Data bindings between the routines of the system provide the basis for the bindings. It appears that the clustering of data bindings provides a meaningful view of system modularization.

DESCRIPTORS: (U) *CLUSTERING, *SYSTEMS ANALYSIS, FOOTWEAR, STRUCTURAL ANALYSIS

IDENTIFIERS: (U) WUAFOSR2304A3, PE81102F

ABSTRACT: (U) This report covers the progress made in the first year of a three year study on the rapid solidification processing (RSP) of Al- and Mg based alloys. In this study, effort has been applied in three areas: (1) processing (both particulate production and consolidation) ; (2) Microstructural effects, and (3) Mechanical properties. The underlying objective has been to control the microstructure to obtain favorable mechanical properties. This will, perforce, entail a detailed understanding of the microstructures, as affected by factors such as alloy chemistry and processing variables, and, in turn, their effects on the mechanical properties. The microstructural changes which occur in heat-treated, as-rapidly solidified materials, as well as those in materials consolidated, either by extrusion or by the relatively new technique of dynamic compaction, have been investigated. The alloy systems studied include: (1) high modulus Al alloys, namely, Al-Mn and Al-Be, (2) Al alloys for elevated temperature applications, namely, Al-8Fe-2Mo, and (3) Mg alloys for elevated temperature applications, namely, Mg-20Gd and Mg-Li-Si. The report is divided into three major sections: (1) Brief overview of RSP of individual alloys, (2) Results, and (3) Future work. Individual sections are further subdivided as appropriate.

AD-A175 031

AD-A175 030

UNCLASSIFIED

PAGE 35

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

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DESCRIPTORS: (U) *ALUMINUM ALLOYS, *MAGNESIUM ALLOYS, *MOLYBDENUM ALLOYS, IRON ALLOYS, MANGANESE ALLOYS, GADOLINIUM ALLOYS, LITHIUM ALLOYS, SILICON ALLOYS, BERYLLIUM ALLOYS, AEROSPACE SYSTEMS, COMPACTING, DYNAMICS, EXTRUSION, MICROSTRUCTURE, POWDER METALLURGY, PROCESSING, ALLOYS, CHEMISTRY, TEMPERATURE, MECHANICAL PROPERTIES, PARTICULATES, PRODUCTION, SOLIDIFICATION, QUICK REACTION

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Distribution of the Maximum of a Gaussian Process by Monte Carlo.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 85-30 Sep 86.

IDENTIFIERS: (U) WUAFOSR2306A1, PE61102F

JUL 86 32P

PERSONAL AUTHORS: Hasofer, A. M. ;

REPORT NO. TR-147

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR
TR-86-2147

UNCLASSIFIED REPORT

ABSTRACT: (U) First a simple practical procedure for approximating a stationary Gaussian process over a finite interval by a trigonometric polynomial with predetermined error is described. The approximation is then used to calculate the distribution of the maximum, using a novel Monte Carlo method with a control variable which drastically reduces the variance. Finally, the outlined approach is compared to the moving-average technique and shown to be superior for continuous-time, narrow-band processes.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, APPROXIMATION(MATHEMATICS), MONTE CARLO METHOD, NARROWBAND, POLYNOMIALS, TRIGONOMETRY, STATIONARY

IDENTIFIERS: (U) *Gaussian Processes

AD-A175 030

AD-A175 029

UNCLASSIFIED

PAGE 36 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 028 CONTINUED

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Asymptotic Properties of Distributed and Communicating Stochastic Approximation Algorithms.

FEB 86 SBP

PERSONAL AUTHORS: Kushner, Harold J. ; Yin, G. ;

REPORT NO. LCDS-86-11

CONTRACT NO. N00014-83-K-0542, AFOSR-81-0118

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-86-2140

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contracts DAAG29-84-K-0542 and N00014-85-K-0607.

ABSTRACT: (U) The asymptotic properties of extensions of the type of distributed or decentralized stochastic approximation proposed are developed. Such algorithms have numerous potential applications in decentralized estimation, detection and adaptive control, or in decentralized Monte Carlo simulation for system optimization (where they can exploit the possibilities of parallel processing). The structure involves several isolated processors (recursive algorithms) who communicate to each other asynchronously and at random intervals. The asymptotic (small gain) properties are derived. The communication intervals need not be strictly bounded and they and the system noise can depend on the (communicating) system state. State space constraints are also handled. In many applications, the dynamical terms are merely indicator functions, or have other types of discontinuities. The typical such case is also treated. The linear stochastic differential equation satisfied by the (interpolated) asymptotic normalized error sequence is derived, and issued to compare alternative algorithms and communication strategies. Weak convergence methods

provide the basic tools.

DESCRIPTORS: (U) *ALGORITHMS, *ASYMPTOTIC NORMALITY, ADAPTIVE CONTROL SYSTEMS, APPROXIMATION (MATHEMATICS), ASYMPTOTIC SERIES, DECENTRALIZATION, DETECTION, ERRORS, ESTIMATES, GAIN, INDICATORS, INTERVALS, LINEAR DIFFERENTIAL EQUATIONS, MONTE CARLO METHOD, NOISE, OPTIMIZATION, PARALLEL PROCESSING, RECURSIVE FUNCTIONS, SEQUENCES, SIMULATION, STOCHASTIC PROCESSES, STRATEGY

AD-A175 028

AD-A175 028

UNCLASSIFIED

PAGE 37

EVJ58L

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 026 CONTINUED

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SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

as over the entire leading blade.

(U) Flow through a Compressor Stage.

DESCRIPTORS: (U) AIR FLOW, COMPRESSORS, STAGING, INTERACTIONS, LEADING EDGES, REGIONS, NUMERICAL METHODS AND PROCEDURES, PITCH(MOTION), STATORS, TWO DIMENSIONAL FLOW, DOWNSTREAM FLOW, ROTOR BLADES, LEADING EDGES, NAVIER STOKES EQUATIONS, MATHEMATICAL MODELS, COMPUTERIZED SIMULATION, BLADES

DESCRIPTIVE NOTE: Final rept. 21 Jun 83-31 May 86.

MAY 86 SEP

PERSONAL AUTHORS: Gabeling, M. J. ; Weinberg, B. C. ; Shureth, S. J. ; McDonald, M. J.

IDENTIFIERS: (U) WJAFOSR2307A4, PE61102F

REPORT NO. R86-910004-F

CONTRACT NO. F49620-83-C-0119

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-86-2181

UNCLASSIFIED REPORT

ABSTRACT (U) The present effort has led to the development of a numerical procedure of the stage flow field based upon solution of the Navier-Stokes equations. The specific case considered is the basic case in which two-dimensional flow and equal rotor and stator pitch are assumed. The procedure developed is capable of obtaining periodic solutions for a grid of 7500 points within ten CPU minutes of Cray run time. This represents a very efficient technique which will permit runs of this type on a regular basis, and which will allow extension to either three dimensions or to stages in which rotor and stator have unequal pitch and the multiple stages. The results obtained show the qualitatively expected features. Periodicity was obtained essentially within five cycles. The major effect of the interaction to the specific case considered appeared in the leading edge region of the downstream rotor blade. Significant perturbation pressures were noted, ΔC_p approx. = 0.4, which has major implications regarding unsteady loading and unsteady fluid structure interaction. The concentration of the interaction effect in the leading edge has particular significance in regard to unsteady pitching moment. Although less significant, unsteady effects were noted over the aft portion of the trailing blade, as well

AD-A175 026

AD-A175 026

UNCLASSIFIED

PAGE 38

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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MATERIALS SCIENCES CORP SPRING HOUSE PA

(U) Thermoviscoelastic Characterization and Analysis of
Fiber Composite Space Structures.

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

FEB 86 170P

PERSONAL AUTHORS: Sullivan, B. J.; Humphreys, E. A.; Hashin,
Zvi;

REPORT NO. MSC-TFR-1614/1505

CONTRACT NO. F49620-85-C-0004

PROJECT NO. 2302

TASK NO. 81

MONITOR: AFOSR
TR-86-2111

UNCLASSIFIED REPORT

ABSTRACT: (U) This report begins with the development of the time and temperature-dependent effective constitutive equations for unidirectional fiber composites. The fibers were represented as transversely isotropic and linearly elastic, temperature dependent elements. The deviatoric components of the isotropic matrix material were treated as linearly viscoelastic and thermorheologically complex, while the dilatation components were represented as elastic and temperature dependent. Numerical simulations of a series of isothermal creep tests were performed to determine the effective creep compliance parameters of the composite constitutive equations. The macro-mechanical response of a composite structural element, as predicted by the effective constitutive equations and their derived parameters, was then verified using results computed using a micro-mechanical model which explicitly included the fiber and matrix as discrete phases. To determine the potential existence and form of a composite complex modulus, the response of unidirectional composite structural elements to simultaneous sinusoidal temperature and mechanical loads was investigated. Finally, solutions of free vibration and transient dynamic analyses of some simple composite structures were

performed to examine the effects of the thermoviscoelastic behavior on the damped response of some simple composite structures.

DESCRIPTORS: (U) *SPACECRAFT, *COMPOSITE STRUCTURES, *FIBER REINFORCED COMPOSITES, DAMPING, RESPONSE, TIME, ELASTIC PROPERTIES, ISOTROPISM, MATRIX MATERIALS, NUMERICAL ANALYSIS, CREEP, PARAMETERS, EQUATIONS, CREEP TESTS, LOADS(FORCES), THERMOELASTICITY, TIME DEPENDENCE, EPOXY COMPOSITES, DYNAMIC RESPONSE, TRANSIENTS, SOLUTIONS(GENERAL), VIBRATION, THERMAL PROPERTIES, VISCOELASTICITY, FIBER REINFORCED COMPOSITES, UNIDIRECTIONAL, TEMPERATURE, STRUCTURAL MEMBERS, UNIDIRECTIONAL

IDENTIFIERS: (U) Constitutive equations, Space structures, Temperature dependence, Thermoviscoelasticity, Eigensolutions, WUAFOSR2302B1, PE61102F

AD-A175 024

AD-A175 024

UNCLASSIFIED

PAGE 39

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ58L

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OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

OSURF-783420, LPN-OSURF-715827, WJAFOSR2307C1, PEG1102F

(U) Variational Principles for Dynamics of Linear Elastic
Fluid-Saturated Soils.

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

JAL 85 48P

PERSONAL AUTHORS: Sandhu, Ranbir S.; Hong, S. J. ;

REPORT NO OSURF-715827-85-3

CONTRACT NO AFOSR-83-0065

PROJECT NO 2307

TASK NO C1

MONITOR AFOSR
TR-86-2086

UNCLASSIFIED REPORT

ABSTRACT (U) Variational Principles for dynamics of the fluid-saturated porous media are derived assuming that soil is linear elastic and deformation is small. Starting with basic mathematical concepts related to the inverse problem of calculus of variation and following the methodology proposed by Sandhu for coupled problems, general variational principles for the problem are developed. Complementary as well as direct formulation are discussed with reference to finite element approximation space and the excitation are allowed for. Extensions of the variational principles to relax smoothness requirements on certain field variables are introduced along with some specializations. Keywords: Coupled problems; Elasticity; Fluid-saturated solids; Seepage; Soil dynamics.

DESCRIPTORS: (U) *SOIL DYNAMICS, MATHEMATICS, COUPLING (INTERACTION), FORMULATIONS, ELASTIC PROPERTIES, INVERSION, CALCULUS, DEFORMATION, DYNAMICS, VARIABLES, LINEARITY, VARIATIONAL PRINCIPLES, SATURATION, SOILS, POROSITY, CALCULUS OF VARIATIONS, FINITE ELEMENT ANALYSIS, DISCONTINUITIES, SEEPAGE

IDENTIFIERS: (U) Saturated soils, Inverse problems, LPN-

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AD-A175 020

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PAGE 40

EVJ58L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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AD-A175 019 CONTINUED

GILLANDIA UNIV NORMAN DEPT OF MATHEMATICS

(U) Estimation and Control of Distributed Models for Certain Elastic Systems Arising in Large Space Structures

MATHEMATICAL MODELS, ACTUATORS, ALGORITHMS, ELASTIC PROPERTIES, APPROXIMATION(MATHEMATICS), DISCRETE DISTRIBUTION, COEFFICIENTS, FLAT PLATE MODELS, BOUNDARY VALUE PROBLEMS, DAMPING, FRICTION, OPTIMIZATION, POSITION(LOCATION), SPACECRAFT, ELLIPSES, DISTRIBUTION, CONTROL SYSTEMS, PARAMETERS

DESCRIPTIVE NOTE Annual rept 2 Jul 84-1 Jan 86.

IDENTIFIERS: (U) Large space structures. WUAFDSR2304A1. PEG1103F

86 7P

PERSONAL AUTHORS White Luther W

CONTRACT NO AFOSR-84-0271

PROJECT NO 2304

TASK NO A1

REPORT AFOSR
TR 86 2193

UNCLASSIFIED REPORT

ABSTRACT (U) This project is to study the estimation and control of elastic systems composed of beams and plates in order to develop efficient and accurate estimation and control algorithms. Results have been obtained for the estimation in static beams and plates, control and location of actuators for static beams and plates, and identifiability for discrete approximations of second order elliptic boundary value problems. Currently testing codes are being developed for numerical experimentation for estimation of damping and elastic coefficients in dynamic linear plate models, estimation of boundary parameters for second order elliptic problems, estimation of elastic coefficients in cantilevered beams using perturbed boundary conditions, optimal location of actuators for the control of beams, and control of plates through forces at points and forces distributed over sets of small measure and curves. The plan is to next investigate boundary control and estimation, estimation and control in structures use of friction as an active control, and parallelization of estimation and control algorithms.

DESCRIPTORS (U) SCIENTIFIC SATELLITES, BENDING, BEAMS, STRUCTURAL, CONTROL, BOUNDARIES, CANTILEVER BEAMS, MODELS, PLATES, DYNAMICS, LINEAR SYSTEMS, LINEARITY

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PAGE 41

EVJ56L

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ58L

AD A175 018 9 8/0 12 8/0 20 8/0
 GSB ASSOCIATES INC WAYLAND MA
 (U) Optical Computing Strategies
 DESCRIPTIVE NOTE Final rept 15 Oct 84-15 Oct 85
 NOV 86 22P
 PERSONAL AUTHORS Barakat Richard
 CONTRACT NO F48620 85-C-0001
 PROJECT NO 2306
 TASK NO 84
 MONITOR AFOSR
 TR 86 2204

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 TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER
 (U) Research on Damage Models for Continuous Fiber Composites
 DESCRIPTIVE NOTE Annual technical rept Feb 85-Feb 86
 FEB 86 290P
 PERSONAL AUTHORS Allen D H ; Harris C E
 REPORT NO MM-5023-86-5
 CONTRACT NO AFOSR-84-0087
 PROJECT NO 2302
 TASK NO 82
 MONITOR AFOSR
 TR-88-2077

UNCLASSIFIED REPORT

ABSTRACT (U) The subject of the current research effort is the development of a theory of optical computing. It is generally agreed that optical computing has an advantage over digital computing in situations where parallelism can be exploited. The canonical examples are matrix-vector multiplication and matrix-matrix multiplication. If the matrices are both square and of size $n \times n$ then outer-product decomposition achieves a saving in computational time because the $M2$ inner products can be evaluated concurrently. It is outlined in Section 1. Our second completed contribution is the development of a tractable mathematical model of an optical system (assuming incoherent light operations and its use into an investigation of the inherent limits of computation of such a system in terms of a lower bound on the simultaneous resources of volume and computing time. Keywords: Electrooptical; Matrix vector multiplication; Canonical

DESCRIPTORS (U) *OPTICAL CIRCUITS, *OPTICAL PROCESSING, COMPUTATIONS, TIME INCOHERENT SCATTERING, LIGHT, OPERATION STRATEGY, SYNCHRONISM, MATHEMATICAL MODELS, TRACTABLE THEORY, MATRICES (MATHEMATICS), ELECTROOPTICS, DIGITAL COMPUTERS

IDENTIFIERS (U) WUAFOSR230584, PEB1102F

AD A175 018

UNCLASSIFIED

PAGE 42

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UNCLASSIFIED REPORT

ABSTRACT (U) Continuous fiber composite laminates are known to undergo a substantial amount of complex load-induced damage which can adversely affect component performance. Therefore, it is desirable to develop new models capable of accounting for the effect of damage on materials properties. The objective of this research is to develop an accurate damage model for predicting strength and stiffness of continuous fiber composite media subjected to fatigue or monotonic loading and to verify this model with experimental results obtained from composite specimens of selected geometry and makeup to be described herein. Keywords: Laminates analysis, failure, finite element methods, internal state variables, plasticity.

DESCRIPTORS (U) *FIBER REINFORCED COMPOSITES, *LAMINATES, COMPOSITE MATERIALS, FINITE ELEMENT ANALYSIS, PLASTIC PROPERTIES, STIFFNESS, DAMAGE, MEDIA, INTERNAL MODELS, FAILURE (MECHANICS)

IDENTIFIERS (U) WUAFOSR230282, PEB1102F

IAC NO PL-050235

AD A175 017

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PAGE 42

EVJ58L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ56L

AD A175 017 CONTINUED

IAC DOCUMENT TYPE PLASTIC MICROFICHE

IAC SUBJECT TERMS P Infinite element analysis, Damage, Strength analysis, Fiber fracture, Stiffness, Laminates, Matrix cracking, Graphite/epoxy 3502 Composites, Epoxy 3502 Transverse cracking, Radiography, Edge replication, Crack initiation, Fracture modes, R and D, Failure analysis, Plasticity, Elastic analysis, Stress analysis, Interface degradation, ZZ Unlimited.

AD A175 015 20 5/0

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Combined Polynomial and Near-Dissociation Representations for Diatomic Spectral Data: C12(X) and I2(X).

86 18P

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

CONTRACT NO. AFOSR-83-0110

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-88-2101

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Spectroscopy, v119 p88-82 1986.

ABSTRACT: (U) Fluorescence data which sample virtually the entire ground state potential wells for C12 and I2 are least-squares analyzed in terms of mixed representations-polynomials in $v + 1/2$ at low v and near-dissociation expansions at high v . Smooth functional expressions for the vibrational energy and rotational constant are obtained by means of exact constraints introduced into the fits by Lagrange's method of undetermined multipliers. The resulting least-squares equations are less ill-conditioned than those often encountered in fitting to high-order polynomials, and the smoothness constraints are satisfied with negligible statistical penalty. The results of the fits are examined for their extrapolating ability and their sensitivity to changes in the orders of the component functions and in the low- v to high- v switchover point.

DESCRIPTORS: (U) *FLUORESCENCE, *DIATOMIC MOLECULES, *PHOTODISSOCIATION, *IODINE, *CHLORINE, CONSTANTS, ENERGY, EQUATIONS, FITTINGS, FUNCTIONS, GROUND STATE, LAGRANGIAN FUNCTIONS, PENALTIES, POLYNOMIALS, ROTATION, SPECTRA, STATISTICS, VIBRATION, REPRINTS

IDENTIFIERS: (U) Lagrangian Multipliers, WUAFOSR2303B1.

AD-A175 015

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PAGE 43 EVJ56L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATERIALS
ENGINEERING

(U) Acquisition of an Analytical Electron Microscopy
Facility.

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

MAR 86 7P

PERSONAL AUTHORS: Duquette, D. J. ;

REPORT NO. 1

CONTRACT NO. AFOSR-85-0040

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-88-2092

UNCLASSIFIED REPORT

ABSTRACT: (U) Reports the acquisition of an electron
microscope facility and X-Ray Analyzer for materials
analysis, and X-Ray Analyzers.

DESCRIPTORS: (U) *X RAY APPARATUS, *ELECTRON MICROSCOPES,
ACQUISITION, FACILITIES, ELECTRON MICROSCOPY, ANALYZERS,
LABORATORY EQUIPMENT, GONIOMETERS

AD-A175 014

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PAGE 44 EVJ56L

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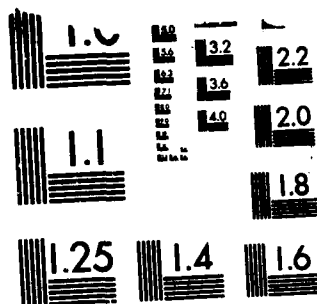
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SAN DIEGO STATE UNIV CA DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

IDENTIFIERS: (U) WUAFOSR2301A7, PE81102F

(U) Electron Production, Electron Attachment, and Charge
Recombination Process in High Pressure Gas Discharges.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-31 Jul 86.

SEP 86 40P

PERSONAL AUTHORS: Lee, Long C.; Wang, Wen C.;

CONTRACT NO. AFOSR-82-0314

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-86-2178

UNCLASSIFIED REPORT

ABSTRACT: (U) The electron attachment rate constants of SO₂, CS₂, and SOCl₂ in buffer gases of Ar, N₂, and CH₄ were measured at various E/N by a parallel plate drift tube electron swarm technique. The initial electron swarm was produced by irradiation of cathode with excimer laser. The electron attachment processes for the electronegative gases studied were investigated. The transient increase of electron conduction current by photoelectron detachment of negative ions in the discharge medium of SOCl₂ in N₂ was observed. This switching is useful for the development of opening switches. Keywords: Electron production; Electron attachment; Electron diffusion; Charge recombination; Electron conduction current; Negative ion; Electron swarm; Electrical discharge; Opening switches; Electron attaching gas; Excimer laser; Parallel-plate drift-tube apparatus; Computer modeling.

DESCRIPTORS: (U) *RECOMBINATION REACTIONS, *ELECTRON TRANSFER, *GAS DISCHARGES, BUFFERS, GASES OPENING(PROCESS), ELECTRONS, ATTACHMENT, DIFFUSION, HIGH PRESSURE, COMPUTERIZED SIMULATION, CONDUCTIVITY, ELECTRIC CURRENT, PRODUCTION, EXCIMER, CATHODES, IRRADIATION, EXCITATION, LASER PUMPING, DRIFT TUBE MASS SPECTROSCOPY, SULFUR OXIDES, CARBON DISULFIDE, THIONYL CHLORIDE, ARGON, NITROGEN, METHANE, ELECTRONIC SWITCHES, ANIONS

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PAGE 45

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A175 010 .20 4/0

SAN DIEGO STATE UNIV CA DEPT OF AEROSPACE ENGINEERING
AND ENGINEERING MECHANICS

(U) Three-Dimensional Laminar Boundary Layers.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 81-31 Dec
84.

FEB 85 4P

PERSONAL AUTHORS: Wang, K. C. ;

CONTRACT NO. AFOSR-81-0109

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2150

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Continuation of Contracts F49620-70-C-
0005 and F49620-76-C-0004.

ABSTRACT: (U) This grant, devoted to the subject of laminar flows in three dimensions. During this period, efforts were first focused on settling the fundamental question of three dimensional separation. New evidences continue to lend support to our open separation concept. Later emphasis was shifted to the preparation of a monograph to bring together the newly developed materials on the subject of three dimensional laminar flows into a unified treatment.

DESCRIPTORS: (U) *FLOW SEPARATION, *THREE DIMENSIONAL FLOW, *LAMINAR BOUNDARY LAYER, SEPARATION, LAMINAR FLOW, THREE DIMENSIONAL

IDENTIFIERS: (U) WUAFOSR2307A1, PES1102F

AD-A175 008 .12 3/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) A Note on Merton's Optimum Consumption and Portfolio Rules in a Continuous-Time Model. Revised.

DESCRIPTIVE NOTE: Technical rept.,

MAY 86 11P

PERSONAL AUTHORS: Sethi, Suresh P. ; Taksar, Michael ;

REPORT NO. FSU-STATISTICS-W745, TR-88-197-AFOSR

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-2146

UNCLASSIFIED REPORT

ABSTRACT: (U) In the area of consumption and portfolio problem in continuous time, Merton is the most widely cited paper. It is an important paper because of its many significant contributions. Among these was the provision of explicit solutions for utility functions in the HARA family specified in equation (43) of Merton's paper. These solutions in the form of lengthy formulas were simply stated without any derivation. Perhaps, because of this, some errors went undetected. While some minor errors were corrected in Merton, the purpose of this note is to delineate the subfamily of HARA utility functions for which the explicit solution obtained in Section 6 of Merton's paper are correct and the remaining subfamily for which they are not.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *ECONOMIC MODELS, CONSUMPTION, EQUATIONS, UTILIZATION, TIME, OPTIMIZATION, STOCHASTIC PROCESSES

IDENTIFIERS: (U) WUAFOSR2304A5, PES1102F

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PAGE

46

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L

AD-A175 006 .20 4/0

AD-A175 006 CONTINUED

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) Asymptotic Solutions to Compressible Laminar Boundary-Layer Solutions for Dusty-Gas Flow over a Semi-Infinite Flat Plate.

DESCRIPTORS: (U) *FLAT PLATE MODELS, *TWO PHASE FLOW, *BOUNDARY LAYER FLOW, ASYMPTOTIC SERIES, COMPRESSION, LAMINAR BOUNDARY LAYER, SOLUTIONS(GENERAL), DRAG, HEAT TRANSFER, NUMERICAL ANALYSIS, DILUTION, GASES, MIXTURES, PARTICLES, DUST, GAS FLOW, LEADING EDGES, PARTIAL DIFFERENTIAL EQUATIONS, LAMINAR FLOW, PHASE, LIMITATIONS, EXPANSION, SERIES(MATHEMATICS), CANADA, APPROXIMATION(MATHEMATICS)

DESCRIPTIVE NOTE: Interim rept..

AUG 86 87P

IDENTIFIERS: (U) MUAFOSR2307A1, PEG1102F

PERSONAL AUTHORS: Wang, B. Y.; Glass, I. I.;

REPORT NO. UTIAS-310

CONTRACT NO. AFOSR-82-0086

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2168

UNCLASSIFIED REPORT

ABSTRACT: (U) An asymptotic analysis is given of the compressible, laminar boundary layer flow of a dilute gas particle mixture over a semi-infinite flat plate. The analysis extends existing work by considering more realistic drag and heat transfer relations than those provided by Stokes. A more general viscosity temperature expression is also incorporated into the analysis. The solution involves a series expansion in terms of the slip parameter of the particles. The numerical results, including the zeroth and first order approximations for the gas and particle phases, are presented for the two limiting regimes: the large slip limit near the leading edge and the small slip limit far downstream. Significant effects on the flow produced by the particles with Stokes' and non-Stokes' relations are studied and clarified. The effects of some nondimensional similarity parameters, such as the Reynolds, Prandtl and Eckert numbers, on the two phase boundary layer flow are discussed. Keywords: Dusty gas flows; Two phase flows; Boundary layer flows; Partial differential equations; Numerical analysis; Canada.

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AD-A175 006

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PAGE 47

EVJ86L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ66L

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

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND
MATERIALS CENTER

(U) Continuum Structure Functions.

(U) Research on Characterization of Damage States in
Continuous Fiber Composites Using Ultrasonic
Nondestructive Evaluation.

DESCRIPTIVE NOTE: Final rept. 22 Jul 83-23 Jul 84.

JUL 84

14P

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 85-31 Jan
86.

PERSONAL AUTHORS: Baxter, Laurence A. ;

CONTRACT NO. AFOSR-84-0243

MAY 86

140P

PERSONAL AUTHORS: Kinra, Vikram K. ;

PROJECT NO. 2304

REPORT NO. NM-5024-86-12

TASK NO. A7

CONTRACT NO. AFOSR-84-0066

MONITOR: AFOSR

PROJECT NO. 2302

UNCLASSIFIED REPORT

TASK NO. B2

ABSTRACT: (U) A continuum structure function is a
nondimensional mapping from the unit hypercube to the unit
interval. The theory of such functions generalizes the
traditional theory of binary and multistate structure
functions, permitting more realistic and flexible
modeling of systems subject to reliability growth,
component degradation and partial availability. A theory
of modules (i.e. subsystems) was developed and, various
sets of bounds were calculated on the distribution of the
structure function when the component states are random
variables. Axiomatic characterizations of two important
special cases are deduced a definition derived of the
reliability importance of the various components, a
theory of cannibalization deduced.

DESCRIPTORS: (U) *MAPPING(TRANSFORMATIONS), *STATISTICAL
ANALYSIS, *RELIABILITY, DEGRADATION, CONTINUUM MECHANICS,
RANDOM VARIABLES, FUNCTIONS, STRUCTURAL PROPERTIES, SPARE
PARTS, THEORY, GROWTH(GENERAL), INTERVALS

IDENTIFIERS: (U) Hypercubes, Structure functions,
WUAFOSR2304A7, PE61103F

AD-A175 005

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES.

AD-A175 004

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PAGE 48

EVJ66L

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-86-2182

ABSTRACT: (U) It is well known that composite materials
suffer complex damage when they are subjected to either
monotonic or fatigue loading. This damage affects both
the velocity and attenuation of ultrasonic waves. The
primary objective of this research is to correlate the
damage states with the changes in the velocity and
attenuation. Once this has been accomplished the pair of
ultrasonic parameters becomes a measure of the damage. A
particular damage mode, namely, transverse cracking has
been examined in detail. The Through-the-thickness
attenuation was found to be a very sensitive measure of
transverse cracking. In order to study the influence of
damage axial stiffness, we have studied the propagation
of Lamb waves. As expected the transverse cracking
significantly reduces the axial stiffness. Finally, a new
experimental technique for measuring speed and
attenuation of ultrasonic waves in laminates of very
small thickness has been developed. Key Words: Ultrasonic
nondestructive testing, Lamb waves.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 004 CONTINUED

ATTENUATION, DAMAGE, PARAMETERS, ULTRASONICS, CRACKS,
COMPOSITE MATERIALS, AXES, STIFFNESS, LAMINATES,
MEASUREMENT, VELOCITY, THICKNESS, NONDESTRUCTIVE TESTING,
WAVE PROPAGATION, ULTRASONIC TESTS, SENSITIVITY

IDENTIFIERS: (U) WIAFOSR230282, PES1102F

IAC NO. NT-036890 PL-060243

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --
PLASTIC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)NDT, NDE, Ultrasonics,
Characterization, Damage assessment, Transverse cracking,
Wave propagation, Attenuation, Laminates, R and D,
Filament wound structures, Crack growth, Graphite fiber/
epoxy, Transverse cracking, Stress waves, Stiffness, Lamb
wave test, Fatigue, Composites, 22 Unlimited; n--(u)
composite materials, ultrasonic testing, damage, lamb
waves, stiffness, laminates, thickness, wave propagation,
technique, development, fiber reinforced composites,
detection;

AD-A175 002 .20 11/0.22 2/0

CLARKSON UNIV POTSDAM NY DEPT OF MECHANICAL AND
INDUSTRIAL ENGINEERING

(U) Nonlinear Analysis and Optimal Design of Dynamic
Mechanical Systems for Spacecraft Application.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 85-31 Jan
86.

FEB 86 37P

PERSONAL AUTHORS: Wilmer, K. D. ; Sathyanarthy, M. ;

CONTRACT NO. AFOSR-84-0078

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2112

UNCLASSIFIED REPORT

ABSTRACT: (U) A nonlinear finite element analysis
procedure already developed for planar mechanisms is
being modified to handle complex mechanisms with sliding
masses and mechanisms operating at relatively high speeds.
Progress is also being made in developing a suitable
nonlinear finite element analysis procedure for three-
dimensional mechanisms. In both cases the analysis takes
into account the effects of geometric and material
nonlinearities, vibrational effects and coupling of
deformations. In the optimal design area, a new algorithm
has been developed for finding the minimum of a sum-of-
squares objective function subject to general nonlinear
constraints. The solution of preliminary examples
indicate good results in terms of the total number of
objective function evaluations to obtain an optimal
design. Complete details of these investigations are
included in the Appendix. To meet the extraordinary
computational needs of this project, a separate research
VAX 11/78S Computer and peripheral equipment were made
available through a DoD research grant. The National
Science Foundation also provided funds for some
additional equipment as well as computational time on a
supercomputer.

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PAGE 49

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 002 CONTINUED

AD-A174 999 .14 3/0

DESCRIPTORS: (U) *NONLINEAR ANALYSIS, *FINITE ELEMENT ANALYSIS, *COMPUTER AIDED DESIGN, *SPACECRAFT, *VIBRATION, NONLINEAR SYSTEMS, FUNCTIONS, SLIDING, MASS, DISTRIBUTION(MATHEMATICS), SPACECRAFT COMPONENTS, SPATIAL COUPLING(INTERACTION), DEFORMATION, DYNAMICS, HIGH VELOCITY, MATERIALS, MECHANICAL COMPONENTS, OPTIMIZATION, PLANAR STRUCTURES, TEST AND EVALUATION, THREE DIMENSIONAL, TIME, DYNAMIC RESPONSE, GEOMETRY

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

(U) High Density Ion Implanted Contiguous Disk Bubble Technology.

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

SEP 85 27P

PERSONAL AUTHORS: Kryder, M. H. ;

CONTRACT NO. AFOSR-84-0341

PROJECT NO. 2308

TASK NO. C1

MONITOR: AFOSR
TR-86-2210

UNCLASSIFIED REPORT

ABSTRACT: (U) Ion implanted contiguous disk bubble memory devices, which were designed and fabricated are being tested. The aim of this testing is to identify the strongest and the weakest elements of these circuits with the hope of designing a fully operational four micron period device. The initial phase of testing has involved obtaining minor loop propagation bias margins, observing the failure mechanisms and attempting to discover the reasons for these failure. Future work will include similar observation for generation, transfer and detection including both bias and current amplitude and phase margins.

DESCRIPTORS: (U) *DETECTION, *BUBBLE MEMORIES, *IONS, *MAGNETIC DISKS, *MEMORY DEVICES, DISKS, HIGH DENSITY, FAILURE, TEST METHODS

IDENTIFIERS: (U) PES1102F, WJAFOSR235C1

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PAGE 50 EVJ56L

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L

AD-A174 985 .12 3/0

ARIZONA UNIV TUCSON APPLIED MATHEMATICS PROGRAM

(U) Markovian Shock Models, Deterioration Processes, Stratified Markov Processes and Replacement Policies.

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

MAY 86 21P

PERSONAL AUTHORS: Newell, Alan ;

CONTRACT NO. AFOSR-84-0256

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-86-2189

UNCLASSIFIED REPORT

ABSTRACT: (U) A list of 37 papers written on research using a VAX 11/750 purchased with funds from AFOSR-84-0256. Research was mainly directed toward numerical solutions of differential equations.

DESCRIPTORS: (U) *MARKOV PROCESSES, MATHEMATICAL MODELS, COMPUTER APPLICATIONS, TRAVELING WAVES, SCHRÖDINGER EQUATION, OPTICAL WAVEGUIDES, DETERIORATION, SHOCK POLICIES, REPLACEMENT, DIFFERENTIAL EQUATIONS, NUMERICAL ANALYSIS, SOLUTIONS(GENERAL), STRATIFICATION

IDENTIFIERS: (U) VAX-11/750 computers, Nonlinear optics, PEG1102F, WUAFOSR2917A5

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PAGE 51

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CALIFORNIA UNIV RIVERSIDE DEPT OF PHYSICS

(U) International Symposium on Correlation and Polarization in Electron-Atom Collisions Held in Pasadena, California on 1-2 August 1986.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 May 86.

AUG 85 33P

PERSONAL AUTHORS: Nickel, John C. ;

CONTRACT NO. AFOSR-85-0225

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-2120

UNCLASSIFIED REPORT

ABSTRACT: (U) Program Abstracts: What we have learned of from e-gamma-coincidence experiments; Time development of Stark Mixed Atomic Hydrogen States; Polarized electron-polarized atom collisions; Polarization in electron collisions with heavy atoms; Elastic Scattering of polarized electrons from Mercury and Xenon for complete evaluation of scattering amplitudes; The three body interaction with long range forces; Spin tagged electron atomic hydrogen scattering; Correlation in electron sodium scattering; Electron atom collision studies using optically state selected beams; anomalous effects in very small angle electron potassium differential scattering measurements; Alignment and Orientation in Collision Processes - What we have learned so far; Electron scattering on Heavy Atoms; Electron photon Angular Correlation parameters; Electron photon coincidence Experiments using molecular Targets; Some Physics with state selected sodium beams; Coherence and correlations in electron collisions with metal vapors; Application of stepwise excitation techniques to polarization correlation and super elastic scattering studies of electron-atom collisions.

DESCRIPTORS: (U) *PARTICLE COLLISIONS, *ELECTRON SCATTERING, STARK EFFECT, HYDROGEN, MOLECULES, COLLISIONS.

AD-A174 992

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 992 CONTINUED

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DIFFERENTIAL CROSS SECTIONS, ANOMALIES, ELASTIC
SCATTERING, ELECTRONS, SODIUM, EXCITATION, CORRELATION,
SYMPOSIA, MERCURY, METAL VAPORS, PHYSICS, POLARIZATION,
ABSTRACTS, BOOIES, INTERACTIONS, TARGETS, XENON

RENSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL
ENGINEERING

(U) Analytical and Experimental Characterization of Damage
Processes in Composite Laminates.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2301A4

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

MAY 86 84P

PERSONAL AUTHORS: Dvorak, George J. ; Laws, Norman ;

REPORT NO. RPI-CECM-2

CONTRACT NO. AFOSR-84-0388

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-86-2180

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of results is presented on the subject of damage development in metal and polymer matrix composite laminates. The following technical developments are described: (i) Evaluation of crack densities, stiffness changes, and fiber stresses caused by cyclic loading in three 8061-0 A18 laminates, with 08 (0/90)2s, and (0/+ or - 45/90/0 + or - 45/1/290s) layers. This problem is solved in an incremental way, with regard for interaction between plastic deformation and matrix crack growth in individual plies. Saturation damage states are predicted at different levels of steady cyclic loading. Good comparison is obtained with available experimental data. (ii) Analysis of first ply failure in polymer matrix composites. The influence of ply thickness on strength is predicted in terms of flaw nucleation mechanisms, and (iii) Analysis of distributed damage caused in a composite ply by either transverse cracks or fiber breaks. Several methods, such as self-consistent estimates, shear lag approximations, crack array models, and finite element analysis of cracks in an embedded ply were employed. It was found that these methods give very similar predictions of stiffness reductions of plies and laminates, and that these predictions are in good

AD-A174 992

AD-A174 991

UNCLASSIFIED

PAGE 52 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 991 CONTINUED

agreement with available experimental data.

DESCRIPTORS: (U) *METAL MATRIX COMPOSITES, *FATIGUE(MECHANICS), *LAMINATES, *POLYMERS, COMPOSITE MATERIALS, CRACKS, DENSITY, CYCLES, LOADS(FORCES), DAMAGE, DISTRIBUTION, FINITE ELEMENT ANALYSIS, DEFECTS(MATERIALS), NUCLEATION, ARRAYS, MODELS, FIBERS, STRESSES, LAYERS, PLASTIC DEFORMATION, MATRIX MATERIALS, APPROXIMATION(MATHEMATICS), DELAY, SHEAR PROPERTIES, REDUCTION, STIFFNESS, TRANSVERSE, CONSISTENCY, STEADY STATE, DAMAGE

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2

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BATTELLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Material Structure in Viscoplasticity: An Extension of Bodner's Theory.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 May 86,

JUL 86 61P

PERSONAL AUTHORS: Williford, R. E. ;

CONTRACT NO. F49620-85-C-0149

MONITOR: AFOSR
TR-86-2125

UNCLASSIFIED REPORT

ABSTRACT: (U) Although Bodner's viscoplastic constitutive equation is useful because it does not require a yield criterion, it also exhibits deficiencies related to hardening behavior. Two new constitutive forms were developed from Bodner's equation to address this problem. The general approach employed scaling relations to define macrostructural response in terms of microstructural evolution. The first new equation expresses strain rate as a function of scaled microstructural models available from the metallurgical literature, and is useful for structural analyses. The second new equation represents a nonlocal model for viscoplasticity. It describes the evolution of internal stress field fluctuations in terms of scaled hardening and damage state variables, and contains the basis for a new material state tensor. The two new equations were verified by comparison to creep data for a steel alloy and aluminum, respectively. Keywords: Bodner's theory, Microstructure; Fractals; Scalings; Nonlocal stress polarizations.

DESCRIPTORS: (U) *STRAIN RATE, *VISCOPLASTIC PROPERTIES, POLARIZATION, STRESSES, ALLOYS, STEEL, STRUCTURAL ANALYSIS, EQUATIONS, EVOLUTION(GENERAL), MICROSTRUCTURE, ALUMINUM, DAMAGE, VARIABLES, MATERIALS, STRUCTURAL PROPERTIES, TENSORS, COMPARISON, CREEP, HARDENING, METALLURGY, STRUCTURAL RESPONSE, SCALING FACTORS, INTERNAL, MODELS

IDENTIFIERS: (U) Constitutive equations, Bodner

AD-A174 991

AD-A174 990

UNCLASSIFIED

PAGE 53

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 990 CONTINUED

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equations, Fractals, Nonlocal stress polarizations,
PEB1102F, MUAFOSR2302B1

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING

- (U) Three-Dimensional Finite Element Analysis of a Slab on Stress Dependent Elastic Solid Foundation.

DESCRIPTIVE NOTE: Final rept. 21 Aug 84-20 Jun 86.

OCT 86 201P

PERSONAL AUTHORS: Ioannides, A. M. ; Thompson, M. R. ;
Donnelly, J. ; Barenberg, E. J. ;

CONTRACT NO. AFOSR-82-0143

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-88-2108

UNCLASSIFIED REPORT

ABSTRACT: (U) This report examined current computerized analysis techniques for slabs on grade. The focus of investigations presented is the application of the three dimensional finite element program GEOSYS for the analysis of a slab, resting on a stress dependent elastic solid foundation. This model can be used to establish baseline structural response data, representative of complex boundary and support conditions, thereby validating conclusions reached on the basis of two dimensional analysis. Many computer runs were conducted to develop user guidelines for the fruitful utilization of the three dimensional approach. Effects considered include mesh fineness and gradation, subgrade extent, boundary conditions, etc. The three fundamental loading conditions, viz. interior, edge and corner, are examined. Two typical single and multi-wheel U.S. Air Force aircraft are employed (F-15 and C-141). An iterative scheme is introduced to account for subgrade stress dependence. The effect of stress softening, typical of cohesive soils, is evaluated and discussed. A number of interesting observations are made, and their bearing on current analysis and design approaches is considered. Two broad areas for future research are identified. The relevance and need of the GEOSYS model to future pavement research/development activities is established. Keywords:

AD-A174 990

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UNCLASSIFIED

PAGE 54 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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Runway Pavements; Slab Model.

DESCRIPTORS: (U) *FOUNDATIONS(STRUCTURES), *PAVEMENTS, *RUNWAYS, AIR FORCE EQUIPMENT, MILITARY AIRCRAFT, BOUNDARIES, MODELS, FINITE ELEMENT ANALYSIS, BASE LINES, STRUCTURAL RESPONSE, CONVECTION, SOILS, ITERATIONS, THREE DIMENSIONAL, TWO DIMENSIONAL, SOLIDS, ELASTIC PROPERTIES, COMPUTER PROGRAMS, LOAD DISTRIBUTION, STRESS ANALYSIS, SUPPORTS, INSTRUCTIONS, USER NEEDS

IDENTIFIERS: (U) Slab structures, GEOSYS computer program, Subgrade supports, PE61102F, WJAFOSR2307C1

AD-A174 985 .9 3/0

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Optically Pumped Short Wavelength Lasers.

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

AUG 85 7P

PERSONAL AUTHORS: Krishnan, Mahadevan ;

CONTRACT NO. AFOSR-84-0382

PROJECT NO. 2301

TASK NO. AB

MONITOR: AFOSR
TR-86-2188

UNCLASSIFIED REPORT

ABSTRACT: (U) All items of equipment were purchased during the period August, 1984 to August 1985. In August, 1985, the Principal Investigator, M. Krishnan, left Yale University for Physics International Co. (PI). At PI, he is pursuing pulsed power driven x-ray lasers. The equipment acquired at Yale remains uncanceled and unused, because of the departure of M. Krishnan and because of the termination of the research Grant (81-0077) on January 31st, 1986.

DESCRIPTORS: (U) *TEA LASERS, *LASER COMPONENTS, OPTICAL PUMPING, X RAYS, RESEARCH MANAGEMENT

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

AD-A174 987

AD-A174 985

UNCLASSIFIED

PAGE 55 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A174 984 .7 1/O.12 3/O.21 2/O
 PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
 ENGINEERING
 (U) Lumped Model Generation and Evaluation: Sensitivity
 and Lie Algebraic Techniques with Applications to
 Combustion.

DESCRIPTIVE NOTE: Annual rept. 10 Sep 85-31 Aug 86,

OCT 86 90P

PERSONAL AUTHORS: Dryer, F. L.; Rabitz, H.; Yetter, R.;

CONTRACT NO. AFOSR-85-0346

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
 TR-86-2106

UNCLASSIFIED REPORT

ABSTRACT: (U) This program dealt with the development and application of new approaches for producing and evaluating semi-empirical (lumped parameter) mathematical models of physical processes. Procedures using local sensitivity gradient methods were used to study the existing lumped kinetic models for the moist carbon monoxide oxidation to show that transport processes can cause oversimplified lumped models derived from homogeneous kinetics to fail when applied to flame propagation systems. New models are under development which will include the appropriate level of detail. A Lie group formalism was developed to address global parameter space mapping issues for first order differential equations. Keywords: Lie Algebra.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *COMBUSTION, *CARBON MONOXIDE, *COMBUSTION CHAMBERS, *EXPERIMENTAL DESIGN, ALGEBRA, DIFFERENTIAL EQUATIONS, FLAME PROPAGATION, GLOBAL, HOMOGENEITY, KINETICS, LIE GROUPS, MOISTURE, OXIDATION, PARAMETERS, TRANSPORT PROPERTIES

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2

AD-A174 984

UNCLASSIFIED

PAGE 56 EVJ56L

SEARCH CONTROL NO. EVJ56L

AD-A174 983 .6 1/O.12 3/O

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Variance Functions and the Minimum Detectable
 Concentration in Assays.

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

JUL 86 36P

PERSONAL AUTHORS: Carroll, R. J.; Davidian, M.; Smith, W.;

REPORT NO. MIMED-SER-1701

CONTRACT NO. F49620-82-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
 TR-86-2166

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Eli Lilly & Company.

ABSTRACT: (U) Assay data are often fit by a nonlinear regression model incorporating heterogeneity of variance, as in radioimmunoassay, for example. Typically, the standard deviation of the response is taken to be proportional to a power theta of the mean. There is considerable empirical evidence suggesting that for assays of a reasonable size, how one estimates the parameter theta does not greatly affect how well one estimates the mean regression function. An additional component of assay analysis is the estimation of auxiliary constructs such as the minimum detectable concentration, for which many definitions exist; we focus on one such definition. The minimum detectable concentration depends both on theta and the mean regression function. We compare three standard methods of estimating the parameter theta due to Rodbard (1978), Raab (1981a) and Carroll and Ruppert (1982b). When duplicate counts are taken at each concentration, the first method is only 20% efficient asymptotically in comparison to the third, and the resulting estimate of the minimum detectable concentration is asymptotically 3.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 983 CONTINUED

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3 times more variable for first than the third. Less dramatic results obtain for the second estimator compared to the third; this estimator is still not efficient, however. Simulation results and an example are supportive of the asymptotic theory. Keywords: Least squares method.

DESCRIPTORS: (U) *BIDASSAY, *ANALYSIS OF VARIANCE, *CONCENTRATION(CHEMISTRY), *LEAST SQUARES METHOD, *REGRESSION ANALYSIS, STANDARD DEVIATION, FUNCTIONS, VARIATIONS, STANDARDIZATION, ESTIMATES, ASSAYING, HETEROGENEITY, MATHEMATICAL MODELS, NONLINEAR ANALYSIS, ESTIMATES, ASYMPTOTIC SERIES, COUNTING METHODS, IONS, RADIOIMMUNOASSAY, MEAN, SIMULATION

IDENTIFIERS: (U) Heteroscelasticity

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

(U) Plasma Deposition of Silicon Carbide Thin Films.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Jul 84-30 Jun 86,

JUL 86 91P

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

CONTRACT NO. F49620-84-0083

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR
TR-86-2038

UNCLASSIFIED REPORT

ABSTRACT: (U) In the plasma studies area, the model for carbon deposition from methane plasmas was extended to include homogeneous chemical kinetics of both neutral and ionized species, and it was tested with extensive plasma characterization experiments varying plasma excitation and flow parameters. In addition, experiments were completed on methane-hydrogen plasmas, and will be compared to the model. Thermal desorption and dissociation kinetic studies of propylene on silicon surfaces has produced several significant results. It was found that surface reactivity could be controlled by creating damage sites via ion bombardment or by capping such sites with atomic hydrogen. In addition, the adsorption of propane and methane were studied at 120K and compared to the double-bonded propylene using kinetic uptake experiments and Auger surface studies. It was found that no sticking is obtained for hydrocarbon molecules that do not have C=C double bonds. This program has produced several journal articles as well as numerous invited and contributed conference talks and papers. Four preprints are attached which describe the main accomplishments of this program during this reporting period.

DESCRIPTORS: (U) *VAPOR DEPOSITION, *CARBON, *SILICON

AD-A174 983

AD-A174 970

UNCLASSIFIED

PAGE 57

EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 970 CONTINUED

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CARBIDES, *THIN FILMS, *PLASMAS(PHYSICS), IONIZATION, NEUTRAL, SILICON, SURFACES, DESORPTION, THERMAL RADIATION, REACTIVITIES, ADSORPTION, PROPANE, AUGER ELECTRONS, DAMAGE, SITES, FLOW, PARAMETERS, HYDROCARBONS, MOLECULES, METHANE, HYDROGEN, CAPPING, KINETICS, DISSOCIATION, REACTION KINETICS, ION BOMBARDMENT

IDENTIFIERS: (U) PEB1102F, WJAFOSR2305B1

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Computation of three Dimensional Viscous Compressible Flow at Hypersonic Velocity.

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

SEP 86 38P

PERSONAL AUTHORS: Candler, Graham V. ;MacCormack, Robert W.

CONTRACT NO. AFOSR-85-0372

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2098

UNCLASSIFIED REPORT

ABSTRACT: (U) A numerical method to solve the perfect gas Navier-Stokes equations for hypersonic flows past three-dimensional blunt bodies has been developed. The numerical method uses flux-splitting and shock-fitting with an implicit Gauss-Seidel line-relaxation procedure to accelerate convergence. The technique has been used to solve the flow field over a spherically blunted biconic and the X24C-100 hypersonic research vehicle. The method has been shown to reduce the number of iterations required to achieve convergence of a typical problem by a factor of about one hundred over an explicit method. The scheme also shows a potential advantage over approximately factored implicit methods. The key advantage of this technique is that the low number of iterations required for convergence does not increase as mesh resolution is refined. Keywords: Hypersonic vehicles; Algorithms; Numerical methods and procedures; Three dimensional flow; Viscous flow; Compressible flow.

DESCRIPTORS: (U) *SHOCK WAVES, *COMPRESSIBLE FLOW, *HYPERSONIC VELOCITY, ALGORITHMS, FLOW FIELDS, HYPERSONIC FLOW, ITERATIONS, NUMERICAL METHODS AND PROCEDURES, BLUNT BODIES, STRUCTURES, GASES, NAVIER STOKES EQUATIONS, HYPERSONIC VEHICLES, THREE DIMENSIONAL FLOW, VISCIOUS FLOW, DATA REDUCTION, GRAPHS

AD-A174 970

AD-A174 988

UNCLASSIFIED

PAGE 58

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 968 CONTINUED

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IDENTIFIERS: (U) Gauss seidel line relaxation, PEG1102F,
WJAFOSR2307A1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL
ENGINEERING

(U) Numerical Simulation of Turbulent Flames Using Vortex
Methods.

DESCRIPTIVE NOTE: Annual progress rept. no. 2, 1 Sep 85-
31 Aug 86,

OCT 86 38P

PERSONAL AUTHORS: Ghoniem, Ahmed F. ;

CONTRACT NO. AFOSR-84-0356

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2067

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research is to develop vortex methods for numerical simulation of multi-dimensional, time-dependent turbulent chemically-reacting flows with high temporal and spatial accuracy. Of particular interest is turbulent shear flows associated with the propagation of turbulent flames in combustion systems. Vortex methods are developed and incorporated in a numerical simulations of turbulent reacting flow, and applied to study the propagation and stability of turbulent flames in different geometrical configurations. At high Damkohler number, a dynamic thin flame model is used, while for slower reactions, the vortex scheme is extended to solve the energy and species equations with finite rate chemical reaction in a Lagrangian particle form. Results have been obtained for a confined mixing layer, a recirculating flow over a rearward facing step, and a confined shallow cavity. Detailed analyses have been performed to validate the numerical schemes and to study the structure and stability of these flows. The scheme has been extended to three dimension flow and an investigation of the transition to turbulence in an axisymmetric shear layer has been initiated. Currently, the combustion algorithm is being linked to the vortex simulation to predict the interaction between the

AD-A174 968

AD-A174 967

UNCLASSIFIED

PAGE 59 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 967 CONTINUED

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turbulent field and the burning process. Keywords:
Turbulent combustion.

DESCRIPTORS: (U) *FLAME PROPAGATION, *COMBUSTION, *TURBULENT FLOW, *VORTICES, NUMERICAL ANALYSIS, FLOW, RECIRCULATION, EQUATIONS, TURBULENCE, SHEAR PROPERTIES, SIMULATION, VORTICES, PARTICLES, ACCURACY, SPATIAL DISTRIBUTION, FLAMES, STABILITY, TRANSITIONS, AXISYMMETRIC, LAYERS, CONFINEMENT(GENERAL), MIXING, THINNESS, CAVITIES, SHALLOW DEPTH, HIGH RATE, CHEMICAL REACTIONS, REACTION KINETICS, COMBUSTION STABILITY, TIME DEPENDENCE, THREE DIMENSIONAL FLOW, ALGORITHMS

IDENTIFIERS: (U) Turbulent combustion, Shear flow

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

(U) The p-Version of the Finite Element Method,

DEC 88 28P

PERSONAL AUTHORS: Katz, I. N.; Wang, Douglas W.;

CONTRACT NO. AFOSR-77-1322

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-88-2074

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Numerical Analysis, v22 n6 p1082-1106 Dec 85.

ABSTRACT: (U) In the p-version of the finite element method, the triangulation of the domain is fixed and the degree p of the local approximating polynomial is increased. This is in contrast with the h-version in which the degree p is fixed and the maximum diameter h of all triangles is allowed to go to zero. We derive a convergence result for the approximating solution to the biharmonic equation when using the p-version. This result shows that the rate of convergence for the p-version with quasi-uniform mesh in the approximation of singular solutions caused by corners. This result which applies to problems which require C sub 1 global continuity is analogous to an earlier result which applied to C sub 0 problems. Applications to several benchmark problems in plate bending are presented. Sample results are examined and compared with theoretical predictions. (Author)

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, BIHARMONIC FUNCTIONS, CONVERGENCE, EQUATIONS, POLYNOMIALS, PREDICTIONS, RATES, SOLUTIONS(GENERAL), THEORY, TRIANGULATION, REPRINTS

IDENTIFIERS: (U) Biharmonic equations, PEG1103F,
WJAFOSR2304A3

AD-A174 967

AD-A174 963

UNCLASSIFIED

PAGE 60

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L

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AD-A174 962 CONTINUED

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Dynamic Stall Penetration Experiments on a Swept Wing.

NUMBER, SURFACE PROPERTIES, TEST METHODS, TWO DIMENSIONAL, UNSTEADY FLOW, VORTEX SHEDDING, WINGS, BOUNDARY LAYER, SEPARATION, VARIABLE PRESSURE, PENETRATION, SUBSONIC CHARACTERISTICS, PRESSURE MEASUREMENT

DESCRIPTIVE NOTE: Annual technical rept. no. 2, 15 Aug 88-15 Aug 88.

SEP 86 21P

IDENTIFIERS: (U) Unsteady aerodynamics, Dynamic stall, Boundary layer separation, P881102F, WJAF03R2307A1

PERSONAL AUTHORS: Carta, Franklin O. ; Lorber, Peter F. ;

CONTRACT NO. F49620-84-C-0082

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2206

UNCLASSIFIED REPORT

ABSTRACT: (U) An experiment was conducted to study the aerodynamic response of a wing to large amplitude pitching motions, including dynamic stall. A two-dimensional model was tested at Mach numbers of 0.2, 0.3, and 0.4, corresponding to Reynolds numbers between 2×10^5 and 4×10^6 . A total of 48 unsteady conditions were studied, including both sinusoidal oscillations and constant pitch rate ramps. The ramp motions ranged up to 0 to 30 deg at pitch rates between 17.8 and 360 deg/sec. A preliminary analysis of the results shows significant effects of pitch rate and Mach number on the surface pressures, integrated airloads, and locations of boundary layer transition and separation. A pressure oscillation was detected in the post stall region that appears to result from periodic vortex shedding that has been synchronized to the imposed pitching motion. A more detailed analysis of these results will be conducted during the remainder of this activity. Keywords: Unsteady aerodynamics; Dynamic stall; Aerodynamic testing; Unsteady measurement techniques.

DESCRIPTORS: (U) *STALLING, *PITCH(MOTION), *SWEEP WINGS, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC LOADING, AMPLITUDE, BOUNDARY LAYER TRANSITION, CONSTANTS, DYNAMICS, INTEGRATED SYSTEMS, MACH NUMBER, MODELS, MOTION, OSCILLATION, PRESSURE, RAMP, RATES, RESPONSE, REYNOLDS

AD-A174 962

AD-A174 962

UNCLASSIFIED

PAGE 61

EVJ86L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Variance Function Estimation.

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

JUL 86

38P

PERSONAL AUTHORS: Davidian, Marie ; Carroll, Raymond ;

REPORT NO. NIMED SER-1700

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2148

UNCLASSIFIED REPORT

ABSTRACT: (U) This document develops a general theory for variance function estimation in regression. Most methods in common use are included in our development. The general qualitative conclusions are these. First, most variance function estimation procedures can be looked upon as regressions with responses being transformation of absolute residuals from a preliminary fit or sample standard deviations from replicates at a design point. Our conclusion is that the former is typically more efficient, but not uniformly so. Secondly, for variance function estimates based on transformations of absolute residuals, we show that efficiency is a monotone function of the efficiency of the fit from which the residuals are formed, at least for symmetric errors. Our conclusion is that one should iterate so that the residuals are based on generalized least squares. Finally, robustness issues are of even more importance here than in estimation of a regression function for the mean. The loss of efficiency of the standard method away from the normal distribution is much more rapid than in the regression problem. Keywords: quality control; heteroscedasticity.

DESCRIPTORS: (U) *QUALITY CONTROL, *REGRESSION ANALYSIS, *ANALYSIS OF VARIANCE, FITTING FUNCTIONS(MATHEMATICS).

AD-A174 961

AD-A174 961

UNCLASSIFIED

PAGE 62

EVJ56L

ERRORS, ESTIMATES, FUNCTIONS, LEAST SQUARES METHOD, MONOTONE FUNCTIONS, NORMAL DISTRIBUTION, RESIDUALS, STANDARD DEVIATION, STANDARDIZATION, SYMMETRY, TRANSFORMATIONS, VARIATIONS

IDENTIFIERS: (U) Heteroscedasticity, PES1102F, WUAFOSR2304AS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ88L

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PEDA CORP PALO ALTO CA

(U) Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.

DESCRIPTIVE NOTE: Annual technical rept. 18 May 83-14 May 84.

AUG 88 38P

PERSONAL AUTHORS: Lombard, Charles K. ;

CONTRACT NO. F49620-83-C-0084

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-88-2186

UNCLASSIFIED REPORT

ABSTRACT: (U) This research has aimed at providing computational tools and procedures as the building blocks for a system to permit efficient solution and high resolution capture of flow structure in gas dynamic problems of realistically complex geometries. The research yielded a comparatively simple algebraic procedure for constructing two dimensional geometry fitted base level composite meshes in quadrilateral patches. The method provides complete control of coordinate distribution and gradient on all patch boundaries which may include slope discontinuities. A robust upwind implicit method (CSCM) was the basis to solve the two dimensional pseudo time dependent Euler or compressible Navier Stokes equations. Research into solution algorithms for that upwind method yielded a more robust diagonally dominant (DDADI) approximate factorization that subsequently led to a family of rapidly convergent and data storage and management efficient relaxation schemes. These effectively explicit and unconditionally stable upwind algorithms have led to a simple robust boundary procedure based on interpolation of conservative variable data from other patches overlying interior patch boundaries where coordinates are discontinuous. Results of preliminary tests with model problems show the desired accuracy and great potential

AD-A174 988

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AD-A174 988

PAGE 63

EVJ88L

for enhancing engineering productivity. Keywords: Euler equations; Flow fields; Algebraic grid generation; Upwind method; Relaxation; and Approximate factorization.

DESCRIPTORS: (U) *AERODYNAMIC CONFIGURATIONS, *GAS DYNAMICS, RELAXATION, ACCURACY, AERODYNAMICS, ALGEBRA, ALGORITHMS, BOUNDARIES, COMPRESSIBLE FLOW, COMPUTATIONS, CONTROL, CONVERGENCE, COORDINATES, DATA STORAGE SYSTEMS, DIFFERENTIAL EQUATIONS, DISTRIBUTION, ENGINEERING, FLOW, FLOW FIELDS, GEOMETRY, GRIDS, HIGH RESOLUTION, INTERPOLATION, MESH, MODELS, NAVIER STOKES EQUATIONS, PRODUCTIVITY, SIMULATION, SOLUTIONS(GENERAL), TWO DIMENSIONAL, VARIABLES

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

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HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) OCCAM First Quarterly Research and Development Status
Report: June-August 1986.

SEP 86

32P

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly technical rept. 1 Jun-31 Aug 86.

NOV 86

18P

PERSONAL AUTHORS: Kosko,Bart ; Guest,Clark ;

CONTRACT NO. F49620-86-C-0070, ARPA Order-5784

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR

TR-86-2129

UNCLASSIFIED REPORT

ABSTRACT: (U) The first quarter of the OCCAM contract effort was especially fruitful. Several pure results were obtained in optical conceptual computing and associative memories. These results include the formal definitions of fuzzy associative memories, the first-principles proof that differential Habbian learning subsumes standard Habbian learning, the construction of a new optically computable fuzzy integral, a quantitative theory of fuzzy cognitive map combination and inferencing, the design and preliminary simulation of a novel all-optical dynamical associative memory, the first optical design for implementing the fundamental fuzzy set/logic operations of pairwise minimum and maximum, the design and preliminary simulation of a translation, rotation, and scale invariant optical preprocessor suitable for pattern recognition by associative memory, and the design and construction of an associative memory demonstration computer board. Several of these results are currently in preparation as technical papers. Some have been presented at professional speaking engagements.

DESCRIPTORS: (U) *ASSOCIATIVE PROCESSING, *LOGIC, *OPTICAL PROCESSING, *COMPUTATIONS, *LEARNING, OPERATION, INVARIANCE, PREPROCESSING, SCALE, THEORY, SIMULATION

IDENTIFIERS: (U) PEG1102F, WJAFOSR230581

AD-A174 957

UNCLASSIFIED

PAGE 84 EVJ58L

PERSONAL AUTHORS: Derstine,Matthew ; Guha,Aloke ; Ramnarayan,Raja ;

CONTRACT NO. F49620-86-C-0082, ARPA Order-5784

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR

TR-86-2213

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the Optical Symbolic Processor for Expert System Execution program is to develop concepts for optical computers which can perform real-time symbolic processing. The program is divided into two sections, architecture development and development of a device for reconfigurable interconnects. In the first quarter of the program, only architecture development work was performed. The approach for this phase of the program has been to examine computational models of computer languages and determine the primitive operations required. Possible optical implementations of these primitives were then examined and evaluated. In general, a top down approach was taken with the goal of a direct optical implementation of the desired primitive operations. It was found that the computational requirements of logic languages and functional languages are primitive operations which involve manipulation of complex data structures such as graphs and trees, and that the execution of the languages can be described as manipulations of those data structures. The representations of the complex data structures imply that the representations must be exact (digital) and that some means to denote connections between data items, such as pointers, is required. Since the representation between data items is more important than the actual items stored,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 986 CONTINUED

the most important functions involve the manipulation of the data structures. Examination of the optical architectures available to represent and implement the functions identified showed some way to perform location addressable memory was needed.

DESCRIPTORS: (U) *MEMORY DEVICES, *ARCHITECTURE, *COMPUTERS, *PROGRAMMING LANGUAGES, *GRAPHS, *OPTICAL PROCESSING, *SYMBOLS, *TREES, PROCESSING, REAL TIME, ADDRESSING, DATA BASES, COMPUTATIONS, REQUIREMENTS, OPTICAL EQUIPMENT, MATHEMATICAL MODELS, SYMBOLS

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5

AD-A174 984 .1 3/0.20 11/0

WISCONSIN UNIV-MADISON DEPT OF MATHEMATICS

(U) Optimal and Insensitive Control of Hyperbolic Distributed Parameter Systems with Applications to Wing Flutter Problems.

DESCRIPTIVE NOTE: Final rept. Feb 84-Jan 86.

JAN 86 72P

PERSONAL AUTHORS: Russell, David L. ;

CONTRACT NO. AFOSR-84-0088

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR
TR-86-2187

UNCLASSIFIED REPORT

ABSTRACT: (U) The titles include: On the Dirichlet Neumann Boundary Control Problem Associated with Maxwell's Equations in a Cylindrical Region, A Floquet decomposition for Volterra Equations with Periodic Kernel and a transform Approach to Linear Recursion Equations, and Mathematical Models for the Elastic Beam and their Control Theoretic Implications, and Mathematical Models for the Elastic Beam with Frequency Proportional Damping.

DESCRIPTORS: (U) *FLUTTER, *VIBRATION, *DAMPING, DECOMPOSITION, FREQUENCY, MATHEMATICAL MODELS, CONTROL, OPTIMIZATION, SENSITIVITY, WINGS, ELASTIC PROPERTIES, DISTRIBUTION, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, MAXWELLS EQUATIONS, VOLTERRA EQUATIONS, RECURSIVE FUNCTIONS, BEAMS(STRUCTURAL)

IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F

AD-A174 985

AD-A174 984

UNCLASSIFIED

PAGE 65

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 963 .13 8/0

AD-A174 962 .20 4/0

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

TORONTO UNIV DONMISVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) Reliability of Complex Devices in Random Environments.

(U) Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.

DESCRIPTIVE NOTE: Interim rept..

JUL 86 36P

DESCRIPTIVE NOTE: Interim rept..

PERSONAL AUTHORS: Cinlar, E. ; Ozekici, S. ;

AUG 86 127P

REPORT NO. EES-86-14

PERSONAL AUTHORS: Wang, B. Y. ; Glass, I. I. ;

CONTRACT NO. AFOSR-82-0188

REPORT NO. UTIAS-311

PROJECT NO. 2304

CONTRACT NO. AFOSR-82-0096

TASK NO. AS

PROJECT NO. 2307

MONITOR: AFOSR

TASK NO. A1

MONITOR: AFOSR

TR-86-2138

TR-86-2151

UNCLASSIFIED REPORT

ABSTRACT: (U) The lifetimes of the components of a device depend on each other because of their joint dependence on the environmental conditions. The authors introduce intrinsic age processes, one for each component, to handle such dependence. The data required can be obtained by experiments under controlled laboratory conditions. The computations needed for randomly varying conditions are recursive and can be used for making decisions regarding maintenance and replacement. Keywords: multi-component devices; semi-markov processes.

DESCRIPTORS: (U) *MATHEMATICAL MODELS. *PARTS. *RELIABILITY. *COMPUTATIONS. *CONTROL. *ENVIRONMENTS. *SEMI-MARKOV PROCESSES. *LABORATORY TESTS. *DECISION MAKING. *MAINTENANCE. *REPLACEMENT. *DISTRIBUTION FUNCTIONS. *EXPERIMENTAL DATA

IDENTIFIERS: (U) MUAFOSR2304AS, PEB1102F

AD-A174 963

UNCLASSIFIED

PAGE 86 EVJ56L

UNCLASSIFIED REPORT

ABSTRACT: (U) A finite difference method is used to investigate compressible, laminar boundary layer flows of a dilute dusty gas over a semi-infinite flat plate. Details are given of the implicit finite difference schemes as well as the boundary conditions, initial conditions and compatibility conditions for solving the gas particle boundary layer equations. The flow profiles for both the gas and particle phases were obtained numerically along the whole length of the plate from the leading edge to far downstream of it. The finite difference solutions in the large slip region and the small slip region are compared with the asymptotic solutions and good agreement is achieved. The boundary layer characteristics of interest, including the wall shear stress, the wall heat transfer rate and the displacement thickness, are calculated. The alteration of the flow properties owing to the presence of particles is discussed in detail. It was found that the boundary layer flow of a dusty gas can be divided into three distinct flow regimes which are characterized by quasi-frozen, nonequilibrium and quasi-equilibrium flows and that at a critical distance from the leading edge the particle

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 952 CONTINUED

velocity at the wall decelerates to zero and near equilibrium is achieved between the gas and particle flows. For the laminar boundary layer of a dusty gas, the shear stress and the heat transfer at the wall are increased and the displacement thickness is decreased compared with the pure gas case alone. (Canada).

DESCRIPTORS: (U) *NONEQUILIBRIUM FLOW, *TWO PHASE FLOW, *DUST, *COMPRESSIBLE FLOW, *LAMINAR BOUNDARY LAYER, *FINITE DIFFERENCE THEORY, *FLAT PLATE MODELS, ASYMPTOTIC SERIES, BOUNDARY LAYER, CANADA, DILUTION, GASES, BOUNDARIES, COMPATIBILITY, RANGE(DISTANCE), DISPLACEMENT, THICKNESS, DOWNSTREAM FLOW, SOLUTIONS(GENERAL), EDGES, PARTICLES, VELOCITY, PURITY, SHEAR STRESSES, WALLS, FLOW, LEADING EDGES, RATES

IDENTIFIERS: (U) WJAFOSR2307A1, PEB1102F

AD-A174 951 .20 9/0.21 1/0.21 2/0

GENERAL ELECTRIC CO SCHEMECTADY N Y RESEARCH AND DEVELOPMENT CENTER

(U) Carbon Monoxide and Turbulence-Chemistry Interactions Measurements and Modeling of Turbulent Jet Diffusion Flames.

DESCRIPTIVE NOTE: Annual rept. 1 May 88-1 Jun 88.

JUN 86 47P

PERSONAL AUTHORS: Correa, S. M. ;

CONTRACT NO. F49620-85-C-0035

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2121

UNCLASSIFIED REPORT

ABSTRACT: (U) Development of a fundamental understanding of turbulence-chemistry interactions remains one of the most important and challenging problems in turbulent reacting flows. This program couples laser based measurements and computer modeling of well-characterized laboratory-scale jet diffusion flames to study the effects of finite-rate chemistry and localized extinction in turbulent combustion. The long-range goal is to use this fundamental understanding for control of lean and high-altitude blow out in gas-turbine engines. The results of the first year of this program include: 1) Improving the data base for CO/H₂/N₂ turbulent jet diffusion flames by analyzing direct measurements of CO₂ concentrations from Stokes vibrational Raman intensities and by comparing two independent methods of determining temperatures from the Raman data; 2) testing of the stretched laminar flamelet concept in turbulent diffusion flames by comparison of instantaneous and conditionally averaged Raman measurements in turbulent H₂ and CO/H₂/N₂ jet diffusion flame calculations and measurements; and 3) testing of a diffusion flame pilot for stabilization of turbulent jet flames at high Reynolds number.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *COMBUSTION.

AD-A174 952

AD-A174 951

UNCLASSIFIED

PAGE 67

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 851 CONTINUED

*TURBULENCE, *JET FLAMES, EXTINCTION, BLOWOFF, LASER APPLICATIONS, DIAGNOSTIC EQUIPMENT, EQUILIBRIUM(GENERAL), REACTION KINETICS, RAMAN SPECTROSCOPY, FUELS, HYDROGEN, NITROGEN, CARBON MONOXIDE, DIFFUSION, FLAMES, PILOTS, ENGINES, GAS TURBINES, RAMAN SPECTRA, DATA BASES, MEASUREMENT, HIGH RATE, REYNOLDS NUMBER, JET FLAMES

IDENTIFIERS: (U) WJAFOSR2308A2, PB81102F

AD-A174 848 .20 4/0.21 1/0

CALIFORNIA INST OF TECH PASADENA

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Annual rept. for period ending 18 Apr 86.

APR 86 43P

PERSONAL AUTHORS: Liepmann, M. W.; Broadwell, J. E.; Dimotakis, P. E.;

CONTRACT NO. AFOSR-83-0213

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2122

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is continuing in both gas phase and liquid phase turbulent mixing and chemical reactions. In the gas phase shear layer work, our investigations are concentrating on shear layer free stream density ratio effects, finite kinetic rate (Damkohler number) effects, and heat release effects the latter up to a temperature rise in the combustion zone of the order of 1,000K. In jet flows, the development of laser Rayleigh scattering techniques is progressing towards conserved scalar measurements down to diffusion space and time scales. In the liquid phase work, laser induced fluorescence measurements in both shear layer and jet flows have yielded considerable new information on the mixing process and statistics, permitting direct estimates as the probability density function in both cases. Theoretical work in progress is addressing the finite chemical rate problem as well as the diffusion limited shear layer mixing problem. Keywords: Turbulence; Flame; Damkohler number; Shear Layer; Jet Combustion.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *TURBULENT FLOW, COMBUSTION, ESTIMATES, GASES, HEAT, JET FLOW, LASER INDUCED FLUORESCENCE, LASERS, LAYERS, LIGHT SCATTERING, LIQUID PHASES, MEASUREMENT, MIXING, PROBABILITY DENSITY FUNCTIONS, RAYLEIGH SCATTERING, RELEASE, SCALAR FUNCTIONS.

AD-A174 951

AD-A174 949

UNCLASSIFIED

PAGE 88 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 949 CONTINUED

SCALE, SHEAR PROPERTIES, TIME, TURBULENCE,

IDENTIFIERS: (U) WUAFOSR2308A2, PEG1102F

AD-A174 946 .20 S/O

SRI INTERNATIONAL MEMLO PARK CA

(U) Two-Photon Detection Techniques for Atomic Fluorine.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 85-1 Jan 86.

APR 86 11P

PERSONAL AUTHORS: Bischof, William K. ;

REPORT NO. SRI-MP-86-080

CONTRACT NO. F48620-85-K-0005

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-86-2124

UNCLASSIFIED REPORT

ABSTRACT: (U) During the first year of the project, the multiphoton spectroscopy of atomic fluorine was investigated to determine if three photon excitation could be used for remote detection applications. The first observation of resonantly enhanced multiphoton ionization (REMPI) of atomic fluorine is reported. Four excited states are observed for dye laser wavelengths in the range of 286 nm corresponding to a three photon resonant transition in a 3+2 photon ionization process. REMPI spectra of molecular fluorine in a 3+1 photon process are also observed. The resonant excited states in the spectra have been identified using absorption spectra published in the literature. In the present experiment, it is estimated that 0.03 millitorr of fluorine atoms can be detected with a signal to noise ratio of two. An apparatus is under development to test the techniques of two photon excited fluorescence and coherent anti Stokes Raman spectroscopy for detection of atomic fluorine.

DESCRIPTORS: (U) *EMISSION SPECTRA, *REMOTE DETECTORS, *EMISSION SPECTROSCOPY, *FLUORINE, OPTICAL PUMPING, RAMAN SPECTROSCOPY, IONIZATION, PHOTONS, REMOTE DETECTORS, EXCITATION, ATOMS, SIGNAL TO NOISE RATIO, RESONANCE, TRANSITIONS, DETECTION

AD-A174 949

AD-A174 946

UNCLASSIFIED

PAGE 69

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 946 CONTINUED

AD-A174 945 .12 3/0

IDENTIFIERS: (U) CARS(Coherent Antistokes Raman Spectroscopy), REMPI(Resonantly Enhanced Multiphoton Ionization), *Three photon absorption, *Multiphoton spectroscopy, WJAFOSR2308A3, PE61102F

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Recent Discoveries on A-Optimal Designs for Comparing Test Treatments with Controls.

DESCRIPTIVE NOTE: Interim rept..

JUN 86 23P

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

REPORT NO. TR-86-04

CONTRACT NO. AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2119

UNCLASSIFIED REPORT

ABSTRACT: (U) This document to introduce the problem with an example. How should we design an experiment to compare 4 test treatments with a control, using 18 experimental units? As a statistical question we will not be able to answer it unless it is asked in a more precise manner. To begin with we need to postulate a model for the response observed upon application of a treatment or control, to an experimental unit. This paper considers three possible models: 1) 0-way elimination of heterogeneity model in which all experimental units are homogeneous before application of treatments, 2) 1-way elimination of heterogeneity model in which the experimental units can be divided into several homogeneous blocks, and 3) 2-way elimination of heterogeneity model in which the experimental units can be conceptually arranged according to rows and columns.

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, HETEROGENEITY, STATISTICAL TESTS, MATHEMATICAL MODELS, OPTIMIZATION

IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F

AD-A174 946

AD-A174 945

UNCLASSIFIED

PAGE

70

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 944 .4 1/0

AD-A174 942 .9 3/0

TEL-AVIV UNIV (ISRAEL) DEPT OF GEOPHYSICS AND PLANETARY SCIENCES

ECODYNAMICS RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) The Morphology of Broken Cloud Fields over Ocean Surfaces Using LANDSAT.

(U) Adaptive Grid Generation.

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

MAY 86 141P

MAY 86 8P

PERSONAL AUTHORS: Joseph, Joachim H. ;

PERSONAL AUTHORS: Roache, Patrick J. ;

CONTRACT NO. AFOSR-84-0357

REPORT NO. ERA-5-86

PROJECT NO. 2310

CONTRACT NO. F49620-82-C-0064

TASK NO. A1

PROJECT NO. 2304

MONITOR: AFOSR
TR-86-2128MONITOR: AFOSR
TR-86-2185

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of our study as outlined in our original proposal were the following: (1) Carry out an initial study of suitably chosen LANDSAT data over both land and sea; (2) Develop the first step in the evolution of semi-automatic computer algorithms to obtain cloud morphology data on a global and long-term basis; (3) Provide a basis for future coordinated satellite, air and ground-based experiments on cloud field properties. (4) Test and improve the modelling of cloud field optical properties for various purposes; (5) Use the data for testing models of atmospheric dynamics on various scales and to develop methods for using cloud morphology data as diagnostics for large scale atmospheric characteristics. These aims have been carried out for the most part.

DESCRIPTORS: (U) *ATMOSPHERIC PHYSICS. *ATMOSPHERICS. MODELS. *CLOUD PHYSICS. ALGORITHMS. CLOUDS. COMPUTERS. GLOBAL. LONG RANGE(TIME). MORPHOLOGY. OPTICAL PROPERTIES. SEMIAUTOMATIC. MARINE METEOROLOGY. METEOROLOGICAL DATA. SCALING FACTORS. OCEAN SURFACE. SCIENTIFIC SATELLITES. ISRAEL

IDENTIFIERS: (U) LANDSAT satellites, Broken cloud fields, WUAFOSR2310A1, PE61102F

AD-A174 944

UNCLASSIFIED

PAGE 71 EVJ56L

ABSTRACT: (U) Algorithms were developed for the generation of grids in 2D and 3D. The 3D code development involved extensive use of computer Symbolic Manipulation. A rigorous code validation procedure was developed. A controversy on the effect of strong coordinate stretching was resolved, with proof that the order of accuracy is not reduced. The contention that a well known method always produces a nonfolded grid was disproven. A family of adaptive algorithms was developed, involving both interior adaption and especially boundary adaption. Initial work was begun on an extension of the variational approach to grid generation. The grid generation algorithms have been applied in the 2D and 3D ELF codes (Electric Field) used in the design of laser electrodes and switches. Applications are in the Pulsed Power area, including SDI research and development. Keywords: adaptive grid generation; elliptic grid generation; symbolic manipulation; code verification; variational formulation; lasers; electrode design.

DESCRIPTORS: (U) *LASER COMPONENTS. *TUBE GRIDS. FABRICATION. EXPERIMENTAL DESIGN. TWO DIMENSIONAL. THREE DIMENSIONAL. LASER MATERIALS. COMPUTER PROGRAMMING. ADAPTIVE SYSTEMS. GRIDS. CODING. ELECTRODES. LASERS. ACCURACY. ELECTRIC FIELDS. ELLIPSES. POWER. APPROACH.

AD-A174 942

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 942 CONTINUED
VARIATIONAL PRINCIPLES

IDENTIFIERS: (U) Strategic defense initiative,
WUAFOSR2304A3, PE61102F

AD-A174 941 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) The Effects of Variance Function Estimation on
Prediction and Calibration: An Example.

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

AUG 86 15P

PERSONAL AUTHORS: Carroll, Raymond J. ;

REPORT NO. MIMED-SER-1703

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-2139

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers fitting a straight line to data when the variances are not constant. In most fields, it is fairly common folklore that how one estimates the variances does not matter too much when estimating the regression function. While this may be true, most problems do not stop with estimating the slope and intercept. Indeed, the ultimate goal of a study may be a prediction or a calibration. It is shown by an example that how one handles the variance function can have large effects. The point is almost trivial, but so often ignored that it is worth documenting. Additionally, this points out that one ought to spend time trying to understand the structure of the variability, a theoretical field that is not particularly well developed. Keywords: weighted least squares; heteroscedasticity.

DESCRIPTORS: (U) *ANALYSIS OF VARIANCE, *ESTIMATES, CALIBRATION, VARIATIONS, LEAST SQUARES METHOD, WEIGHTING FUNCTIONS, FUNCTIONS, REGRESSION ANALYSIS, MATHEMATICAL PREDICTION

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A174 942

UNCLASSIFIED

AD-A174 941

PAGE 72 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 940 .23 3/0

SRI INTERNATIONAL MENLO PARK CA

(U) Research on Problem-Solving Systems.

DESCRIPTIVE NOTE: Annual rept. (Final), 1 Oct 85-30 Sep 86.

OCT 86 19P

PERSONAL AUTHORS: Wilkins, David E. ;

CONTRACT NO. F49620-85-K-0001

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-86-2190

UNCLASSIFIED REPORT

ABSTRACT: (U) The main task of this program is to develop powerful methods of representing, generating, and executing hierarchical plans that contain parallel actions. Execution involves monitoring the state of the world and, possibly, replanning if things do not proceed as expected. Over the last few years, we have designed and implemented a system called SIPE (System for Interactive Planning and Execution Monitoring), the purpose of which is to demonstrate the heuristic adequacy of our approach to this problem. Our basic in procedural networks. Our research this year concentrated on improving SIPE to provide a high-level reasoning capability for a mobile robot. Topics include: Sonar interfaces; Low-level sonar preception; Improving the replanning algorithm; Matching variables with PREO constraints; Efficiency considerations. Keywords: Control systems; Artificial intelligence.

DESCRIPTORS: (U) *SYSTEMS APPROACH, *PROBLEM SOLVING, ALGORITHMS, ARTIFICIAL INTELLIGENCE, CONTROL SYSTEMS, GLOBAL, HIERARCHIES, INTERACTIONS, INTERFACES, LOW LEVEL, MATCHING, MOBILE, PLANNING, ROBOTS, SONAR, VARIABLES

IDENTIFIERS: (U) SIPE(System for Interactive Planning and Execution monitoring)

AD-A174 940

UNCLASSIFIED

AD-A174 938 .12 3/0.25 3/0

CONNECTICUT UNIV STORRS

(U) Summary of Accomplished Work under the Air Force Grant AFOSR-83-0228.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 83-31 Jul 85.

MAY 86 5P

PERSONAL AUTHORS: Papantoni-Kazekos, P. ;

CONTRACT NO. AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2149

UNCLASSIFIED REPORT

ABSTRACT: (U) A theory for robust filtering and smoothing is formulated that combines the qualitative robustness theory with the theory of saddle point games. This theory finds robust filters for certain contaminated classes of stochastic processes. Robust predictors, interpolators, and filters are designed for various classes of vector stationary processes with contaminated spectra. Measures of breakdown points and curves, efficiency, and performance variation within the classes are produced. A variety of multiple access transmission protocols are designed for various levels of available feedback and feedback sensing. The studies include asymptotically many user models. Limited sensing algorithms are devised with the with the highest existing throughput, to this point in time, and with robust characteristics in the presence of feedback errors. A unified methodology for the delay analysis of a big variety of random access algorithms is devised.

DESCRIPTORS: (U) *ALGORITHMS, *PREDICTIONS, *STOCHASTIC PROCESSES, STATISTICAL PROCESSES, *INTERPOLATION, *MULTIPLE ACCESS, LIMITATIONS, MODELS, RANDOM ACCESS COMPUTER STORAGE, SPECTRA, TRANSMITTANCE, USER NEEDS, VECTOR ANALYSIS, CONTAMINATION, DETECTION, ERRORS, FEEDBACK

AD-A174 938

PAGE 73 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 938 CONTINUED

AD-A174 938 .12 2/0

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A5

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) Numerical Analysis.

DESCRIPTIVE NOTE: Final rept. 15 Jun 82-14 Jun 86.

JUN 86 10P

PERSONAL AUTHORS: Parter, Seymour V. ;

CONTRACT NO. AFOSR-82-0275

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-2080

UNCLASSIFIED REPORT

ABSTRACT: (U) New development in computer architecture (parallel computers and multi-processors) and a renewed interest in 3-dimensional problems and higher-order problems have revived interest in iterative methods for elliptic and parabolic finite-difference/finite-element equations. This document considers the linear system $Ax = y$ which arises from the discretization of an elliptic boundary-value problem. A direct (linear stationary) iterative method arises from the splitting $A = M - N$ and takes the form Mx to the $k + 1$ power $= Nx$ to the k power $+ y$.

DESCRIPTORS: (U) *NUMERICAL ANALYSIS. *ITERATIONS. BOUNDARY VALUE PROBLEMS, COMPUTER ARCHITECTURE, DIFFERENCE EQUATIONS, ELLIPSES, FINITE DIFFERENCE THEORY, FINITE ELEMENT ANALYSIS, LINEAR SYSTEMS, PARABOLAS, PARALLEL PROCESSORS, MULTIPROCESSORS, THREE DIMENSIONAL

IDENTIFIERS: (U) WJAFOSR2304A3, PE81102F

AD-A174 938

AD-A174 938

UNCLASSIFIED

PAGE 74

EVJ56L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 930 .12 1/O.12 9/O

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) On Frequency Detection by Zero-Crossings.

86 5P

PERSONAL AUTHORS: Kedem, Benjamin ;

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-2081

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Signal Processing, v10 p303-308 1988.

ABSTRACT: (U) It is possible to solve explicitly for the frequency of a sinusoid in the presence of noise in terms of expected zero-crossings counts. This may, however, lead to highly variable estimates. A more robust method is to combine linear filtering with zero-crossing counts in the detection of very weak signals buried in noise.

DESCRIPTORS: (U) *DETECTION, *ESTIMATES, *LINEAR FILTERING, *SIGNALS, LOW STRENGTH, VARIABLES

IDENTIFIERS: (U) PB81102F, WUAFSOSR2304A5

AD-A174 928 .6 1/O.6 11/O

ROCHESTER UNIV NY

(U) The Cytoskeleton: A Target for Toxic Agents. Proceedings of the Rochester International Conference on Environmental Toxicity (16th) Held in Rochester, New York on 4-8 June 1984.

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

86 277P

PERSONAL AUTHORS: Clarkson, Thomas W. ;

CONTRACT NO. AFOSR-84-0088

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-86-2041

UNCLASSIFIED REPORT

Availability: Plenum Press, 233 Spring St., New York, NY 10013 PC \$42.50 (No copies furnished by DTIC/NTIS).

ABSTRACT: (U) An in-depth discussion of the effects and mechanisms of action of some toxic agents on the cytoskeleton is provided. Mammalian and other eukaryotic cells contain protein networks within the cytoplasm comprised of microfilaments, intermediate filaments, and microtubules. These components of the cytoskeleton play a key role in cell shape, motility, intracellular organization and transport, and cell division. Because of the complex functional roles of the cytoskeleton which vary with cell type, degree of differentiation, and cell cycle, its disruption may result in a variety of cellular changes. This expanding field in cell biology has already attracted the interest of toxicologists and environmental health scientists as a potentially fruitful area of research. There is mounting evidence that certain toxic and chemotherapeutic compounds, as well as physical agents such as radiation and hydrostatic pressure, disrupt the normal structure and function of the cytoskeleton.

DESCRIPTORS: (U) *TOXICOLOGY, *FIBERS, *PROTEINS.

AD-A174 928

AD-A174 930

UNCLASSIFIED

PAGE 75

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 928 CONTINUED

*CYTOPLASM, CELLS(BIOLOGY), CELL DIVISION, CELL STRUCTURE, CYCLES, SHAPE, FIBERS, TOXICITY, TOXIC AGENTS, TUBES, HYDROSTATIC PRESSURE, FILAMENTS, MICROSTRUCTURE, NETWORKS

IDENTIFIERS: (U) WJAFOSR2312A5, PE61102F

AD-A174 921 12 9/0.20 12/0

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Study of Infrared Nonlinear Processes in Semiconductors.

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

SEP 86 8P

PERSONAL AUTHORS: Wolff, P. A.; Yuan, S. Y. ;

CONTRACT NO. AFOSR-85-0269

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-86-2211

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary aim of the program is to discover materials and/or structures with large, fast nonlinear optic susceptibilities. Such elements are required in optical signal processing systems, and for protection of imaging devices. The program is mainly experimental, with supporting theoretical work. Tests of nonlinear crystals also provide important information concerning carrier kinetics in semiconductors, through the difference frequency variation of $\chi^{(3)}$. In the past year, we have used this technique to determine carrier relaxation times, in the picosecond range, in n-Si : P and HgTe. Where appropriate, we investigate the device implications of optical-semiconductor interactions. Our studies of free carrier, spin-induced Faraday rotation, were motivated by the possibility of using this effect in tunable IR filters and CO2 laser isolators.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *SEMICONDUCTORS, *NONLINEAR SYSTEMS, CRYSTALS, DIFFERENCE FREQUENCY, IMAGES, INFRARED RADIATION, KINETICS, OPTICAL EQUIPMENT, OPTICAL PROCESSING, PROTECTION, THEORY, VARIATIONS

IDENTIFIERS: (U) WJAFOSR230581, PE61102F

AD-A174 928

AD-A174 921

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PAGE 78 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 919 CONTINUED

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

(U) The Study of Certain Aspects of Probability with
Applications in Communication Theory.

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

JUN 86 22P

PERSONAL AUTHORS: Wise, Gary L. ;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2212

UNCLASSIFIED REPORT

ABSTRACT: (U) Many aspects of signal processing and communication theory have proven to be limited by a lack of sufficient developments in the areas of probability theory and mathematical statistics. Our investigations attempted to overcome this deficiency by contributing both to the underlying theoretical basis of the area as well as to some applied aspects of the area, and we have obtained a large body of results. Some principal thrust areas of our research effort have been concerned with quantization theory, signal detection, and estimation theory. A brief topical overview of our research areas follows. Quantization - existence of optimal quantizers, convergence properties of sequences of quantizers, design of quantizers. Signal detection - effects of statistical dependence, relative efficiency between detectors, nonparametric detection, Estimation - effects of imperfect data, a general class of fidelity criteria leading to nonlinear estimators, convergence properties of sequences of estimators; and Additional areas - median filters; stability of differential equations with random coefficients; bandwidth properties of random processes; contention resolution in local area computer networks; image compression; counterexamples.

DESCRIPTORS: (U) *PROBABILITY, *INFORMATION THEORY,

AD-A174 919

AD-A174 919

UNCLASSIFIED

PAGE 77

EVJ56L

*DETECTORS, *ESTIMATES, *COMMUNICATIONS NETWORKS,
*QUANTIZATION, *CONVERGENCE, *STATISTICAL ANALYSIS,
*SIGNAL PROCESSING, THRUST, STABILITY, DETECTION,
COMPUTERS, NETWORKS, ESTIMATES, NONLINEAR SYSTEMS,
COMPRESSION, IMAGES, OPTIMIZATION, COEFFICIENTS,
BANDWIDTH

IDENTIFIERS: (U) WJAFDSR2304AS, PE81102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 917 CONTINUED

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COMPUTATIONAL MECHANICS CO INC AUSTIN TX

(U) Models and Computational Methods for Dynamic Friction Phenomena. I. Physical Aspects of Dynamic Friction. II. Continuum Models and Variational Principles for Dynamic Friction. III. Finite Element Models and Numerical Analysis.

DESCRIPTIVE NOTE: Interim rept..

OCT 84 214P

PERSONAL AUTHORS: Oden, J. T.; Martins, J. A. ;

REPORT NO. TR-84-07

CONTRACT NO. F49620-84-C-0024

PROJECT NO. 2302

TASK NO. 81

MONITOR: AFOSR
TR-86-2206

UNCLASSIFIED REPORT

ABSTRACT: (U) This work addresses the general problems of formulating continuum models of a large class of dynamic frictional phenomena and of developing computation methods for analyzing these phenomena. Of particular interest are theories which can adequately predict stick slip motion, frictional damping in structural dynamics, and sliding resistance. This work is divided into three principal parts. In Part I, a large body of experimental and theoretical literature on friction is critically reviewed and interpreted as a basis for models of dynamic friction phenomena. In Part II, continuum models of interfaces are developed which simulate key interface properties identified in Part I. Variational principles for a class of dynamic friction problems are also established. In Part III, finite element models and numerical algorithms for analyzing dynamic friction are presented. Also, a dynamic stability analysis is presented in which it is established that stick slip motion can be associated with dynamic instability of the governing nonlinear system for certain ranges of slip velocity and coefficient of friction.

AD-A174 917

AD-A174 917

UNCLASSIFIED

PAGE 78

EVJ58L

Numerical results suggest that the new models derived here can satisfactorily depict a large and important class of dynamic friction effects. Keywords: Friction damping; Sliding friction models; Finite element methods; and Structural dynamic.

DESCRIPTORS: (U) *FRICTION, *FINITE ELEMENT ANALYSIS, *SLIDING FRICTION, *VARIATIONAL PRINCIPLES, ALGORITHMS, COEFFICIENTS, CONTINUUM MECHANICS, DAMPING, DYNAMICS, INTERFACES, MATHEMATICAL MODELS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, RESISTANCE, SLIDING, STABILITY, STRUCTURAL PROPERTIES

IDENTIFIERS: (U) WJAFOSR2302B1, PE81102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 916 .10 2/0.20 5/0 AD-A174 916 CONTINUED

OREGON GRADUATE CENTER BEAVERTON DEPT OF APPLIED PHYSICS
AND ELECTRICAL ENGINEERING*

(U) Investigation of Surface Phenomena in Thermionic
Energy Conversion.

DESCRIPTIVE NOTE: Final rept. 1 Mar 83-31 Jul 86.

OCT 86 62P

PERSONAL AUTHORS: Davis, P. R. ;

CONTRACT NO. AFOSR-83-0106

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-86-2100

UNCLASSIFIED REPORT

ABSTRACT: (U) The general goal of this project has been to enhance the understanding of surface phenomena related to thermionic energy conversion (TEC), in particular, surface properties of electrode materials which have the potential of enhancing significantly the performance of practical devices for advanced mode TEC. A variety of surface analysis techniques has been devoted to study of clean surface properties of Lanthanum Boride single crystals. Investigations of residual gas interactions with low work function emitter surfaces has been directed toward the study of O₂ interactions with low work function single crystal faces of Lanthanum Boride. Measurements were made on both the clean and oxidized Lanthanum Boride surfaces using Auger electron spectroscopy (AES) and x-ray photoelectron spectroscopy (XPS) and quadrupole mass spectrometry (QMS) for analysis of the desorbing molecular species. The nature of the surface oxide species were correlated with thermal evaporation characteristics. The coadsorption of Zirconium and oxygen onto Tungsten causes a lowering of the work function of the (100) crystal plane from 4.7 to 2.6 eV. The resulting surface is remarkably stable and practical application as a cathode for fine-focused beam applications.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *SURFACE CHEMISTRY, *ENERGY CONVERSION, *THERMIONIC CONVERTERS, AUGER ELECTRON SPECTROSCOPY, BORIDES, ELECTRODES, EVAPORATION, GASES, HEAT, INTERACTIONS, LANTHANUM COMPOUNDS, MASS SPECTROMETRY, MATERIALS, RESIDUALS, OXIDATION, OXIDES, OXYGEN, QUADRUPOLE MOMENT, SINGLE CRYSTALS, SURFACE ANALYSIS, SURFACE PROPERTIES, SURFACES, TUNGSTEN, WORK FUNCTIONS, X RAY PHOTOELECTRON SPECTROSCOPY

IDENTIFIERS: (U) Desorption, Adsorption, Zirconium, Crystal structure

AD-A174 916

AD-A174 916

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PAGE

78

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ88L

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 CALIFORNIA UNIV IRVINE DEPT OF ELECTRICAL ENGINEERING
 MCDONNELL DOUGLAS ASTRONAUTICS CO HUNTINGTON BEACH CA
 (U) DoD-University Research Instrumentation Program.
 (U) Passively Damped Joints for Advanced Space Structures.
 DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Apr 86.
 OCT 86 10P

PERSONAL AUTHORS: Tsai, Chen S. ;
 CONTRACT NO. AFOSR-84-0270
 PROJECT NO. 2917
 TASK NO. A3
 MONITOR: AFOSR
 TR-86-2089

PERSONAL AUTHORS: Peebles, James H. ; Trudell, Richard W. ;
 Blevins, Creed E. ; Prucz, Jacky C. ;
 REPORT NO. MDC-H2334
 CONTRACT NO. F49620-83-C-0117
 PROJECT NO. 2302
 TASK NO. B1
 MONITOR: AFOSR
 TR-86-2078

UNCLASSIFIED REPORT

ABSTRACT: (U) The capability of this facility was rather limited in terms of line resolution, contact uniformity, fabrication yield, and versatility. Although much encouraging results have been demonstrated with the preliminary devices, the lack of an ion-milling machine has kept on-going research projects from achieving much more results expeditiously. Similarly, the lack of the Ion Milling Machine has kept the group from fabricating micron-width grooves, slots, gratings, ridge waveguide, etc., on LiNbO3 and GaAs substrates for robust coupling between the optical fibers and the devices being explored, and thus realization of integrated optic device modules. An Ion-Milling Machine has been purchased. A special laboratory compartment together with necessary electrical and wet-lab utilities were constructed for installation of the complete ion milling machine facility. The facility will be in full operation in the near future.

DESCRIPTORS: (U) *MILLING MACHINES, LITHIUM NIOBATES, GRATINGS(SPECTRA), LABORATORY EQUIPMENT, OPTICAL WAVEGUIDES, FABRICATION, FIBER OPTICS, GALLIUM ARSENIDES, INSTRUMENTATION, ION BEAMS, OPERATION, RESOLUTION, RIDGES, SPECTRAL LINES, SUBSTRATES, WAVEGUIDES, YIELD

IDENTIFIERS: (U) WJAFOSR2917A3, PE61102F

AD-A174 915

UNCLASSIFIED

AD-A174 914

PAGE 80 EVJ88L

UNCLASSIFIED REPORT

ABSTRACT: (U) This report includes: (1) the development of a viscoelastic materials selection guide for this research activity; (2) the development of an analytic statics model of the joint specimens; (3) the designs, fabrication and testing of 21 viscoelastic joint specimens, including the development of a new material; (4) the procurement, fabrication and assembly of test equipment for the test program at the Georgia Institute of Technology as well as the development of data reduction computer programs; (5) the development and successful demonstration of transient pulse and simplified steady state methods for evaluating energy losses in joints; and (6) the performance of outgassing tests on several viscoelastic materials.

DESCRIPTORS: (U) *DAMPING, *JOINTS, *SPACE SYSTEMS, *STRUCTURES, STATICS, COMPUTER PROGRAMS, PASSIVE SYSTEMS, ASSEMBLY, DATA REDUCTION, DEMONSTRATIONS, ENERGY, LOSSES, MATERIALS, MATHEMATICAL MODELS, OUTGASSING, PERFORMANCE TESTS, PULSES, STATICS, TEST EQUIPMENT, TEST METHODS, TRANSIENTS, VISCOELASTICITY

IDENTIFIERS: (U) WJAFOSR2302B1, PE61102F

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AD-A174 912 .12 1/0.14 2/0 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L
AD-A174 912 CONTINUED

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

FUNCTIONS, PARTS, SENSITIVITY, TIME DEPENDENCE

(U) A Stochastic Characterization of the Sine Function.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304AB

JUL 86 13P

PERSONAL AUTHORS: Kadem, Benjamin ;

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in American Mathematical Monthly,
V93 n6 p430-440 Jun-Jul 86.

ABSTRACT: (U) It is shown that conditions based on level crossings and related quantities can ensure that a random sequence contains sinusoidal components. The results are first motivated by considerations of data-reduction in signal analysis, and then formulated precisely for stationary Gaussian sequences. An analogy is drawn with a characterization of the sine function in the nonrandom case. The problem dealt with in this paper derives from an important problem of modern technology: the signature problem. To understand the problem, consider the real life example of an operating automobile engine monitored by an electronic device which records the engine's vibration as an oscillating signal. This oscillating signal, regarded as a function of time characterizing the engine's operating condition, is called the engine's signature. The signature problem is generally to use the signature to tell whether the engine is functioning properly or malfunctioning, and to detect abnormalities such as cracks in the engine block and parts. Signature analysis is regularly performed on various sensitive parts of aircraft which may develop cracks or fractures as a result of metal fatigue.

DESCRIPTORS: (U) *ABNORMALITIES, *VIBRATION, *CROSSINGS, *SIGNALS, *SIGNATURES, *SINE WAVES, AIRCRAFT, AUTOMOTIVE VEHICLES, CRACKS, ELECTRONIC EQUIPMENT, ENGINES.

AD-A174 912

AD-A174 912

UNCLASSIFIED

PAGE 81

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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AD-A174 910 14 2/0.20 12/0

WISCONSIN UNIV-MILWAUKEE DEPT OF PHYSICS

ATTENUATION, LABORATORY TESTS, LABORATORY EQUIPMENT, ATTENUATION, ELECTRODES, PROBES, FILMS, REFRIGERATION SYSTEMS, SURFACE ACOUSTIC WAVES, MAGNETIC FIELDS, TRANSDUCERS

(U) System for Investigating Superconducting Films with Surface Acoustic Waves Down to 4.5 Millikelvin and Up to 4 GHz.

IDENTIFIERS: (U) *Superconducting films, Dilution refrigerators, PEB1102F, WJAFOSR2817A3

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

JUL 85 BP

PERSONAL AUTHORS: Levy, Moises ;

CONTRACT NO. AFOSR-84-0221

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-86-2091

UNCLASSIFIED REPORT

ABSTRACT: (U) A system for investigating superconducting films with surface acoustic waves down to 4.3 millikelvin up to frequencies of 4 GHz and up to magnetic fields of 95 K Gauss has been ordered, received and assembled. A dilution refrigerator has been installed in a new laboratory. It has been tested in place down to 4.3 millikelvin. The refrigerator has a top loading probe with four interchangeable slugs which can be used for different millikelvin temperature experiments. Each slug has 13 electrical leads which can be connected at millikelvin temperatures. A superconducting magnet has been obtained which has been tested up to 95 K Gauss in conjunction with a helium lambda tip. All the parts for an automatic ultrasonic attenuation and velocity system in the frequency range of 10 MHz have been ordered and assembled. Parts for the submicron photolithography subsystem required to reproduce masks with linewidths of 0.3 u which will be used for making interdigital electrodes which will act as transducers to launch surface acoustic waves in the GHz range have been received and assembled.

DESCRIPTORS: (U) *SURFACE ACOUSTIC WAVES, *SUPERCONDUCTORS, EXPERIMENTAL DESIGN, ACOUSTIC

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AD-A174 910

UNCLASSIFIED

PAGE 82

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 908 .5 2/O.12 5/O AD-A174 908 CONTINUED

IONA UNIV IOWA CITY OPTIMAL DESIGN LAB

(U) A Database Management System for Engineering Applications.

DESCRIPTIVE NOTE: Interim rept. Jul 84-Jun 85.

JUN 85 163P

PERSONAL AUTHORS: Shyy, Y-K.; Mukhopadhyay, Santanu; Arora, Jasbir S.;

REPORT NO. ODL-85.23

CONTRACT NO. AFOSR-82-0322

PROJECT NO. 2307

TASK NO. 81

MONITOR: AFOSR
TR-86-2205

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Master's thesis.

ABSTRACT: (U) This report describes design of a database management system called MIDAS which stands for Management of Information for Design and Analysis of Systems. The system is designed to handle large matrix data of different types. A prototype system is first implemented. The system is re-designed to improve its efficiency. Capabilities of the system are described. It is evaluated in the engineering environment by solving systems of linear equations. The system is flexible; its buffer size, page size and number of pages can be changed. Variations of these parameters is studied and their effect on the system performance is evaluated. It is concluded that the application programs must be developed carefully to efficiently use a database management system. In addition, application programmer must be somewhat knowledgeable of the internal workings of the system.

DESCRIPTORS: (U) *DATA BASES. *SYSTEMS ENGINEERING, DATA MANAGEMENT, MATHEMATICAL MODELS, SUBROUTINES, LINEAR ALGEBRAIC EQUATIONS, INPUT OUTPUT PROCESSING, THESES

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AD-A174 908

UNCLASSIFIED

PAGE 83 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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WISCONSIN UNIV-MILWAUKEE DEPT OF PHYSICS

SPIN STATES, CRYSTAL STRUCTURE, ERBIUM COMPOUNDS, HOLMIUM COMPOUNDS, RHENIUM COMPOUNDS, BERYLLIUM COMPOUNDS, URANIUM COMPOUNDS, RUTHENIUM COMPOUNDS, SILICON COMPOUNDS, ENERGY ABSORBERS, ELECTRICAL RESISTANCE, SHEETS, ELECTRICAL CONDUCTIVITY, GRAIN SIZE, ACOUSTIC ATTENUATION, VELOCITY, WAVES

(U) Thin Superconducting Film Characterization by Surface Acoustic Waves.

DESCRIPTIVE NOTE: Annual progress rept. 30 Sep 85-30 Sep 86.

NOV 86 14P

IDENTIFIERS: (U) Indium oxides, Spin photon interactions.
*Superconducting films, PEB102F, WUAFDSR2308C1

PERSONAL AUTHORS: Levy, Moises ;

CONTRACT NO. AFOSR-84-0350

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-86-2090

UNCLASSIFIED REPORT

ABSTRACT: (U) Surface acoustic wave attenuation (SAW) and electrical resistivity on In/InO films has been measured. On one film it was found that both vortex antivortex dipoles associated with a Kosterlitz Thouless transition and excess local resistivity associated with granularity of the film contribute to the energy absorption in the film. On another film, with a high sheet resistivity, a peak in attenuation is observed which may be associated with a metal insulator transition at the local level. A technique for determining average grain size in a granular superconductor has been proposed. Proximity acoustoelectric coupling to a granular Al superconducting film has been demonstrated. This technique may be used to determine the separation between two surfaces that are less than 1000A apart. Measurement on the Er(1-x)Ho(x)Rh484 alloy system have been completed. A theoretical relaxation expression has been derived and is being used to analyze the maxima that have been observed in the attenuation curves. Preliminary measurements of both the attenuation and velocity of longitudinal waves in a single crystal of URu2Si2 have been performed.

DESCRIPTORS: (U) *SUPERCONDUCTORS, *SURFACE ACOUSTIC WAVES, *THIN FILMS, INDIUM, INDIUM COMPOUNDS, OXIDES.

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PAGE 84

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 902 CONTINUED

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OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Motion and Stability of Saturated Soil Systems under Dynamic Loading.

examined parametrically. It was found that soil displacements are not sensitive to the degree of coupling, but the pattern of pore pressure in the time domain could be affected significantly.

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

DESCRIPTORS: (U) *LIQUEFACTION, *SOIL MECHANICS, *DYNAMIC LOADS, INTEGRATION, TIME DOMAIN, NONLINEAR SYSTEMS, PERMEABILITY, FINITE ELEMENT ANALYSIS, COUPLING(INTERACTION), MASS, WAVE PROPAGATION, PATTERNS, PORE PRESSURE, GEOMETRY, POROSITY, SATURATION, SOILS, MATERIALS, TWO DIMENSIONAL, FORMULATIONS, DISPLACEMENT, SATURATION, VARIATIONAL PRINCIPLES

APR 85 20P

PERSONAL AUTHORS: Sandhu, Ranbir S. ;

REPORT NO. OSURF-715927-85-5

CONTRACT NO. AFOSR-83-0055

IDENTIFIERS: (U) Biot Theory, LPN-OSURF-763420/716894, PE61102F, WUAF0SR2307C1

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-88-2094

UNCLASSIFIED REPORT

ABSTRACT: (U) In a review of the assumptions underlying various theories of interacting continua, an important finding was that the notion of the mixture as a continuum in motion is inadmissible except in the case of no relative motion between the constituents. Liquefaction of soil is primarily associated with relative motion of soil and water. Finite element implementation of Biot's theory was studied in respect to effectiveness of the popular time integration schemes as well as spatial discretization for one and two-dimensional wave propagation. Results showed that the conventional time-domain integration procedures which are quite effective for single material problems are not reliable for saturated soils. The numerical results were found to be quite sensitive to the choice of time-domain integration parameters. Variational formulations of Biot's theory were developed to construct a basis for alternative finite element approaches. For nonlinear problems, incremental equations were developed and variational formulation attempted allowing only material nonlinearity. In saturated soils subjected to dynamic loads, depending upon permeability and pore geometry, a part of the water would possibly be trapped and move with the soil rather than relative to it. This mass coupling effect was

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AD-A174 902

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PAGE 85

EVJ56L

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AD-A174 900 CONTINUED

ARIZONA UNIV TUCSON ENGINEERING EXPERIMENT STATION

(U) Experiments in an Adaptable-Wall Wind Tunnel for V/
STOL Testing.

DESCRIPTIVE NOTE: Final rept. 1 May 82-30 Sep 88.

SEP 88 184P

PERSONAL AUTHORS: Sears, W. R. ; Lee, D. C. ;

CONTRACT NO. AFOSR-82-0185

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-88-2088

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments were carried out, over a period of two years, in an Adaptable-Wall wind tunnel configured for testing of airplane models at very large lift. The program was intended especially to demonstrate Proof of Concept for this type of wind tunnel, in which the simulated stream vector is inclined appreciably to the tunnel axis. The measured inner flow is matched to the computed, updated outer flow by an iterative process. Wall-adaptation controls in this tunnel are varied panels in the floor and ceiling of the working section and a variable-angle inlet nozzle. Velocity components are measured by a Laser-Doppler system using a fixed laser and movable optical components. The test model used in these experiments was a high-wing V/STOL configuration having full-span wing flaps with lower-surface blowing of their inboard portions. In all of the experiments reported here, the combination of angle of attack, flap setting, and flap blowing was such as to produce large flow deflection and severe wall interference in a conventional tunnel. The model configuration was always laterally symmetrical, and most runs were made under the assumption of symmetrical flow. The iterative procedure, based on measured control matrices, typically led to minimum matching-discrepancies (root-mean-square values) of about three percent of stream speed after about six iterations. It is estimated that this reflects residual

AD-A174 900

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PAGE 86

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errors at the model of about one percent of stream speed. It is concluded that these results constitute successful Proof of Concept. Suggestions are made regarding the directions of further development of this type of wind tunnel. (Author)

DESCRIPTORS: (U) *WIND TUNNELS, *SHORT TAKEOFF AIRCRAFT, *VERTICAL TAKEOFF AIRCRAFT, ADAPTATION, AIRCRAFT MODELS, AXES, CEILING, CONFIGURATIONS, DEFLECTION, DOPPLER SYSTEMS, ERRORS, EXTERNAL, FLAPS(CONTROL SURFACES), FLOW, HIGH RATE, INTENSITY, INTERFERENCE, ITERATIONS, LASERS, LIFT, MOBILE, MODEL TESTS, OPTICAL EQUIPMENT, RESIDUALS, SETTING(ADJUSTING), SIMULATION, STREAMS, SYMMETRY, TEST METHODS, VELOCITY, WALLS, WINGS, WIND TUNNEL MODELS, HIGH LIFT, WIND TUNNEL NOZZLES, WING BODY CONFIGURATIONS, ANGLE OF ATTACK, BLOWERS, CONTROL SYSTEMS, COMPUTER PROGRAMS, EXPERIMENTAL DESIGN

IDENTIFIERS: (U) Wind tunnel walls, Blowing flaps, *Adaptable wall wind tunnels, Computer program listings, BASIC programming language, PE81102F, WJAFDSR2307A1

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 898 CONTINUED

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL
ENGINEERING

(U) Ignition of Fuel Sprays.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 83-30 Sep
85.

JUN 86 31P

PERSONAL AUTHORS: Sirignano, W. A. ; Sommer, H. T. ; Aggarwal,
S. K. ;

CONTRACT NO. AFOSR-80-0203

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2207

UNCLASSIFIED REPORT

ABSTRACT: (U) One-dimensional unsteady calculations to study the spray ignition process were performed first for a monodisperse fuel-air spray in front of a planar heated wall and later for polydisperse single-component fuel sprays. The effect of different droplet heating models was investigated and it is found that at certain equivalence ratios ignition delay time and energies can be smaller in the heterogeneous case than in the limiting gaseous premixed case. Because of the critical dependency of ignition upon the distance of the heat source to the nearest droplet, spray ignition criteria are not precisely defined by fuel type, droplet size distribution and equivalence ratio but a range of ignition delay times and ignition energies is found due to the probabilistic effect of droplet ignition. For polydisperse sprays it was found that ignition can be well correlated with an equivalent monodisperse spray by using a mean diameter based on the total surface area of the spray and not the Sauter-mean-diameter. The experimental part of the program was designed to verify the theoretical spray ignition description and should help in understanding the physics and chemistry of the process. It focused on the importance of transport mechanisms on individual fuel droplet ignition.

AD-A174 898

AD-A174 898

UNCLASSIFIED

DESCRIPTORS: (U) *FUEL SPRAYS, *IGNITION, ENERGY, GASES, MIXING, PHYSICS, PROBABILITY, SPRAYS, DIAMETERS, MEAN, HEAT, PLANAR STRUCTURES, SURFACES, TRANSPORT PROPERTIES, FUEL AIR RATIO, IGNITION LAG, PARTICLE SIZE, COMBUSTION, DISPERSIONS, VAPORS, CHEMISTRY, DROPS, RATIOS, HETEROGENEITY, MODELS, DISTRIBUTION, SIZES(DIMENSIONS)

IDENTIFIERS: (U) Combustible sprays, Spray ignition, PE81102F, WJAFOSR2308A2

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 895 .8 10/0.20 4/0

AD-A174 889 .12 3/0.13 8/0

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Mechanical Behavior of Saturated Soils - A Review.

(U) A Covariance Inequality for Coherent Structures.

DESCRIPTIVE NOTE: Annual rept. no. 10. 1 Feb 83-31 Jan 85,

DESCRIPTIVE NOTE: Technical rept..

JUN 85 143P

JUN 86 9P

PERSONAL AUTHORS: Sandhu, Ranbir S. ;

PERSONAL AUTHORS: Joag-Dev, Kumar ; Proschan, Frank ;

REPORT NO. OSURF-715927-85-1

REPORT NO. FSU-STATISTICS-M733

CONTRACT NO. AFOSR-83-0055

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2307

PROJECT NO. 2304

TASK NO. C1

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR
TR-86-2095

TR-86-2095

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Theories of mechanical behavior of saturated soils are reviewed. The discussion spans the classical approaches to quasi-static and dynamic response of deformable porous media as well as theories of mixtures and their application in geomechanics. Different approaches to description of motion of superposed continua, derivation of balance laws and development of constitutive relationships are compared. The notion of motion of the mixture as a single body is questioned. Alternative concepts of behavior of liquid-solid mixtures are considered. The role of thermodynamic principle in development of constitutive relationships is examined. Keywords: Balance laws; Constitutive relations; Consolidation; Flow through deformable porous media; Liquefaction; theories of mixtures.

DESCRIPTORS: (U) *SATURATION, *SOIL MECHANICS, *LIQUEFACTION, DEFORMATION, DYNAMIC RESPONSE, LIQUIDS, MECHANICAL PROPERTIES, MIXTURES, MOTION, POROUS MATERIALS, SOLIDS, THEORY, BALANCE, MULTIPHASE FLOW, SOIL MODELS, STRESS STRAIN RELATIONS, WAVE PROPAGATION

IDENTIFIERS: (U) *Saturated soils, Constitutive equations, Geomechanics, LPN-OSURF-715927/763420, PE81102F, WJAFOSR2307C1

AD-A174 895

AD-A174 889

UNCLASSIFIED

PAGE 88 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 886 .12 4/O

AD-A174 881 .12 2/O

PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND
ASTRONAUTICS

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Controller Synthesis for Distributed Parameter Systems.

(U) A Theorem of I. Schur and its Impact on Modern Signal
Processing.

DESCRIPTIVE NOTE: Final rept. 15 May 82-14 Nov 84.

86 23P

APR 86 135P

PERSONAL AUTHORS: Kallath, Thomas ;

PERSONAL AUTHORS: Skelton, R. E. ;

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

CONTRACT NO. AFOSR-82-0209

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. AB

TASK NO. K1

MONITOR: AFOSR,ARO

TR-86-2199,23453.2-MA

MONITOR: AFOSR
TR-86-2083

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This research seeks to unify certain problems of distributed parameter control: model reduction, control, sensor/actuator selections/failure, and decentralized control. These topics are all related and are to be unified through the quadric performance metric with use of cost decomposition methods. The final research topic on model error estimation is required to make vernier adjustments after best models and controllers are developed, to absorb remaining modeling errors. During the period covered by the grant, 18 conference and journal research papers were written. Titles include: Computer Aided Design of Suboptimal LQG Controller, Cost Equivalent Realizations of Stochastic Processes, Component Cost Analysis of Large Scale Systems, Comments on Realizations and Reduction of Markovian Models for Nonstationary Data, and On the Selection of Controller Order for the Control of Linear Dynamic Systems.

DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, *OPERATIONS RESEARCH, COMPUTER AIDED DESIGN, CONTROL, COST ANALYSIS, COSTS, DECENTRALIZATION, DECOMPOSITION, DISTRIBUTION, DYNAMICS, ERRORS, ESTIMATES, LINEAR SYSTEMS, MARKOV PROCESSES, PARAMETERS, REDUCTION, SELECTION, STOCHASTIC PROCESSES, SYNTHESIS, MATHEMATICAL MODELS

SUPPLEMENTARY NOTE: Pub. in Operator Theory: Advances and Applications, v18 p10-30 1986.

ABSTRACT: (U) An algorithm of Schur for Characterizing power series that are bounded in the unit circle is shown to have applications to a variety of problems in science and engineering. These include speech analysis and synthesis, inverse scattering, decoding of error-correcting codes, synthesis of digital filters, modeling of random signals, Padé approximation for linear systems, and zero location of polynomials. We also demonstrate an intimate relation between Schur's algorithm and the recently introduced concept of displacement structure, which is fundamental to the construction of efficient procedures for factorization, inversion and eigenanalysis of matrices. It also has meaningful links with the theory of operators close to Hermitian and close to unitary. (Reprints).

DESCRIPTORS: (U) *ALGORITHMS, *STRUCTURAL PROPERTIES, *APPROXIMATION(MATHEMATICS), *SPEECH ANALYSIS, *ERROR CORRECTION CODES, *INVERSE SCATTERING, *SIGNAL PROCESSING, DISPLACEMENT, LINEAR SYSTEMS, REPRINTS, DIGITAL FILTERS, SYNTHESIS, CIRCLES, DECODING, MODELS, SIGNALS, POWER SERIES, OPERATORS(PERSONNEL), THEORY

IDENTIFIERS: (U) PEG102F, WJAFOSR2304A8

AD-A174 886

AD-A174 881

UNCLASSIFIED

PAGE 89

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 880 .20 11/O.22 2/0 AD-A174 880 CONTINUED

BOSTON UNIV MA

spacecraft, Rotating reference frames, PE8102F,
WUAFOSR2304A1

(U) The Control Theory of Flexible and Articulated
Spacecraft.

DESCRIPTIVE NOTE: Interim rept. 15 Apr 85-14 Apr 86.

MAY 86 45P

PERSONAL AUTHORS: Baillieu, John ; Levi, Mark ;

CONTRACT NO. AFOSR-85-0144

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2082

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes work done on the dynamics and control of flexible and articulated spacecraft. The combined dynamical effects of elasticity and a rotating reference frame have been explored for structure in a zero gravity environment. A simple yet general approach to modeling was developed, and applied to analyze the dynamics of a specific prototypical structure. The effects of energy dissipation were included and studied in depth for a model problem. Equilibria, bifurcations, and asymptotic stability were analyzed in some carefully chosen examples which capture the essential general features of nonlinear distributed parameter models of rotating elastic structures. Keywords: Classical mechanics; Rotating reference frames; Rotating elastic media.

DESCRIPTORS: (U) *SPACECRAFT, *CONTROL THEORY, *FLEXIBLE STRUCTURES, *ROTATION, ASYMPTOTIC SERIES, DISSIPATION, DISTRIBUTION, DYNAMICS, ELASTIC PROPERTIES, ENERGY, ENVIRONMENTS, FRAMES, MATHEMATICAL MODELS, METHODOLOGY, MODELS, NONLINEAR SYSTEMS, PARAMETERS, STABILITY, STRUCTURES, WEIGHTLESSNESS, CONTROL SYSTEMS, JOINTS, SPACE ENVIRONMENTS; BIFURCATION(MATHEMATICS), MECHANICS, EQUILIBRIUM(PHYSIOLOGY)

IDENTIFIERS: (U) Flexible spacecraft, Articulated

AD-A174 880

AD-A174 880

UNCLASSIFIED

PAGE 90

EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 878 CONTINUED

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

IDENTIFIERS: (U) *Nonlinear Filtering, *Stochastic Calculus, Weiner Processes

(U) Some Recent Results in Nonlinear Filtering Theory with Finitely Additive White Noise.

DESCRIPTIVE NOTE: Technical rept..

NOV 85 12P

PERSONAL AUTHORS: Kallianpur, G. ;

REPORT NO. TR-125

CONTRACT NO. F49620-82-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2198

UNCLASSIFIED REPORT

ABSTRACT: (U) Nonlinear filtering theory has been developed over the last few decades, largely, as an application of stochastic calculus. The theory (which will be referred to below as the conventional or stochastic calculus theory) has led to many important new advances in the subject and, indeed, given rise to problems of interest to stochastic calculus itself. When it comes to statistical applications, however, the approach based on stochastic calculus has many shortcomings which originate from the use of the Wiener process as a model for noise. This point has been recognized by many writers and has led to attempts to create a pathwise or robust version of the theory this article presents a very brief outline of an alternative approach developed recently in collaboration with R.L. Karandikar. In this theory, the Wiener process is replaced by finitely additive (f.a.) Gaussian which noise in the filtering model in which we also assume the independence of signal and noise.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *MATHEMATICAL FILTERS, CALCULUS, STATISTICS, THEORY, WHITE NOISE, GAUSSIAN QUADRATURE, MATHEMATICAL MODELS

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AD-A174 878

UNCLASSIFIED

PAGE 91

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A174 876 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Evolution Equations with Values on the Dual of a Countably Hilbert Nuclear Space.

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

JUL 86 60P

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

REPORT NO. TR-145

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2197

UNCLASSIFIED REPORT

ABSTRACT: (U) The work begins a study of stochastic evolution equations (SEE) driven by nuclear space valued martingales. The existence and uniqueness of solutions of perturbed SEE's is also considered. An illustration of the equations treated here is the SEE obtained by Mitoma in connection with the central limit theorem for the propagation of chaos.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, EVOLUTION(GENERAL), HILBERT SPACE, THEOREMS, PERTURBATIONS

IDENTIFIERS: (U) Martingales, Nuclear space.
WUAFOSR2304A5, PE61102F

AD-A174 876

UNCLASSIFIED

SEARCH CONTROL NO. EVJ58L

AD-A174 866 .9 3/0.12 6/0.14 2/0.20
7/0.20 9/0

MARYLAND UNIV COLLEGE PARK

(U) Department of Defense Instrumentation Award.

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

JUL 85 6P

PERSONAL AUTHORS: Destler, William W.;

CONTRACT NO. AFOSR-84-0267

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-86-2031

UNCLASSIFIED REPORT

ABSTRACT: (U) These funds were used to purchase a complete fast digital data acquisition system now completely installed in the Charged Particle Beam Laboratory at the University of Maryland. This instrumentation, consisting of five channels of fast digitization (two donated by the University) controlled by a DEC 11/73 computer, is now assembled in a shielded room with trench access to all of the experiments underway in the laboratory. The projects of Department of Defense interest supported by this instrumentation are listed below: Propagation of Intense Charged Particle Beams Into Vacuum, Propagation of short Burst, High Power Microwave Pulses through Neutral and Ionized Media, Free Electron Lasers Driven by Electromagnetic Pump Waves, and High Power Microwave Radiation from a Relativistic Backward wave oscillator.

DESCRIPTORS: (U) *ANALOG TO DIGITAL CONVERTERS, *ELECTROMAGNETIC PUMPS, *PARTICLE BEAMS, *MEDIA, *CHARGED PARTICLES, *FREE ELECTRON LASERS, *PROPAGATION, ACCESS, CHANNELS, ELECTROMAGNETIC RADIATION, HIGH POWER, INTENSITY, IONIZATION, LABORATORIES, MARYLAND, MICROWAVE EQUIPMENT, NEUTRAL, PULSES, RADIATION, RADIOFREQUENCY POWER, RUPTURE, SHIELDING, SHORT RANGE(TIME), SPACE(ROOM), TRENCHES, VACUUM

AD-A174 866

PAGE 92 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 860 .8 7/0.8 8/0.12 3/0
 NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Correlation Length and its Critical Exponents for Percolation Processes.

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

JUL 86 10P

PERSONAL AUTHORS: Nguyen, B. G. ;

REPORT NO. TR-144

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
 TR-88-2203

UNCLASSIFIED REPORT

ABSTRACT: (U) This document first defines the model and introduce the notation the author uses in this paper. A site percolation process in Z sub d (here $d > 0$ or $= 2$) is a family of probability measures p sub p , p epsilon $(0, 1)$ together with a collection of random variables ϵ_{α} : Z sub d approx $(0, 1)$ such that under p sub p the ϵ_{α} 's are independent and p sub p ($\epsilon_{\alpha}(x) = 1 = p$). A site x is thought of being occupied (nonoccupied) if $\epsilon_{\alpha}(x) = 1$ ($\epsilon_{\alpha}(x) = 0$). We say that x is connected to y if there is a path of occupied sites connecting x and y ; i.e. there is a sequence of sites x sub $0 = x$, x sub 1 , x sub 2 , ..., x sub $n = y$ in Z sub d so that x sub i and x sub $i + 1$ are nearest neighbors and $\epsilon_{\alpha}(x$ sub $i) = 1$ for every $i = 0, 1, 2, \dots, n$. We denote this event by $(x$ approaches limit of $y)$. Let C sub $0 = \{ \alpha : 0 \text{ approaches limit of } \alpha \}$. We say that C sub 0 is the cluster containing 0 .

DESCRIPTORS: (U) *PERCOLATION, *CORRELATION TECHNIQUES, INEQUALITIES, EXPONENTIAL FUNCTIONS, DECAY SCHEMES, COLLECTION, CORRELATION, LENGTH, RANDOM VARIABLES, SEQUENCES, SITES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 860

UNCLASSIFIED

PAGE 93

EVJ58L

AD-A174 853 .20 8/0
 CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

(U) Parallel Optical Data Processing.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-1 Feb 86.

AUG 86 60P

PERSONAL AUTHORS: Lee, Sing H. ;

CONTRACT NO. AFOSR-84-0336

PROJECT NO. 2305

TASK NO. 84

MONITOR: AFOSR
 TR-86-2020

UNCLASSIFIED REPORT

ABSTRACT: (U) Optical computing has been effective at solving computationally difficult problems. Optical computing research has high risk, but high potential benefits. AFOSR has had the lead role in basic optical computing research and must continue this role in coordination with other government and industrial funding. Current and future optical computing systems can be organized into a unified structure with five major components: input, processor array, interconnections, memory, output. Optics has great potential advantages in speed, bandwidth and parallelism, but electronics has the advantages of a well-developed technology. Basic research needs: -Materials - nonlinear, synthetic structures, processing element arrays - SMLs, interconnections/ memories - materials, devices, arrays, architectures/ algorithms - utilize parallelism.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL DATA, *PARALLEL PROCESSING, *OPTICAL PROCESSING, *COMPUTATIONS, PROCESSING EQUIPMENT, ALGORITHMS, ARCHITECTURE, ARRAYS, BENEFITS, DATA PROCESSING, HIGH RATE, OPTICAL EQUIPMENT, OPTICS, RISK, STRUCTURES, SYNTHETIC MATERIALS

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4

AD-A174 853

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 846 .20 8/0.20 10/0 AD-A174 846 CONTINUED

LAWRENCE LIVERMORE NATIONAL LAB CA

IDENTIFIERS: (U) Born approximation, DIRAC HARTREE
SLATER wave functions, AB initio calculations

(U) Relativist Calculation of Atomic N-Shell Ionization by
Protons,

JUL 86 7P

PERSONAL AUTHORS: Chen, Mau H. ; Grasseman, Bernd ;

CONTRACT NO. F49620-85-C-0040

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0923

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v34 n1 p87-
92 Jul 86.

ABSTRACT: (U) Relativistic plane-wave Born-approximation
calculations of cross sections for N shell ionization of
Bi 83 and U 92 by protons with incident energies from 0.
02 to 5 Mev are reported. The calculations were carried
out by using Dirac-Hartree-Slater wave functions. Binding
energy change and Coulomb deflection were taken into
account. The relativistic cross sections are compared
with values from nonrelativistic Hartree-Slater wave
functions to study the effects of relativity. A test
calculation with hydrogenic wave functions yields very
different results. The only available measurements (for W
74), revised with a corrected 4 d fluorescence yield,
agree with present theoretical predictions for $E_{sub 1} <$
or $= 0.1$ Mev but fall below theory by a factor of 6 above
 $E_{sub 1} = 0.4$ Mev. This glaring discrepancy invites
further investigation. Keywords: Atomic physics;
Ionization; Reprints.

DESCRIPTORS: (U) *BISMUTH, *URANIUM, *WAVE FUNCTIONS,
*NUCLEAR SHELL MODELS, PLANE WAVES, DIFFERENTIAL CROSS
SECTIONS, NUCLEAR PHYSICS, THEORY, IONIZATION, PROTONS,
COMPUTATIONS, NUCLEAR BINDING ENERGY, DEFLECTION,
HYDROGEN, WAVE FUNCTIONS, YIELD, MATHEMATICAL PREDICTION,
REPRINTS

AD-A174 846

AD-A174 846

UNCLASSIFIED

PAGE 94

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 831 .20 4/0

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

(U) On the Prediction of Highly Vortical Flows Using an Euler Equation Model.

DESCRIPTIVE NOTE: Final rept. 13 Jun 84-15 Jun 85.

FEB 86 83P

PERSONAL AUTHORS: Marconi, Frank ;

REPORT NO. RE-713

CONTRACT NO. F49620-84-C-0058

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2073

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the power of the Euler equations in the prediction of conical separated flows is presented. These equations are solved numerically for the highly vortical supersonic flow about circular and elliptic cones. Two sources of vorticity are studied; the first is the flow field shock system and the second is the vorticity shed into the flow field from a separating boundary layer. Both sources of vorticity are found to produce separation and vortices. In the case of shed (i.e., separation point) is determined empirically. Solutions obtained with both sources of vorticity are studied in detail, compared with each other, and with potential calculations and experimental data.

DESCRIPTORS: (U) *FLOW SEPARATION, *SUPERSONIC FLOW, *VORTICES, BOUNDARY LAYER, CIRCULAR, COMPUTATIONS, CONICAL BODIES, DIFFERENTIAL EQUATIONS, ELLIPSES, FLOW, FLOW FIELDS, MATHEMATICAL MODELS, SEPARATION, SHOCK TESTS, SOURCES, SUPERSONIC FLOW, VORTICES, MATHEMATICAL PREDICTION, SHOCK, MATHEMATICAL PREDICTION, VORTEX SHEDDING

IDENTIFIERS: (U) Vortical flow, Euler equations, PE61102F, WUAFOSR2307A1

AD-A174 831

UNCLASSIFIED

PAGE 95

EVJ58L

AD-A174 826 .21 2/0

YALE UNIV NEW HAVEN CT HIGH TEMPERATURE CHEMICAL REACTION ENGINEERING LAB

(U) Transport Phenomena and Interfacial Kinetics in Multiphase Combustion Systems.

DESCRIPTIVE NOTE: Annual technical rept. 1 Dec 83-30 Nov 84.

JAN 86 12P

PERSONAL AUTHORS: Rosner, Daniel E. ;

CONTRACT NO. AFOSR-84-0034

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2044

UNCLASSIFIED REPORT

ABSTRACT: (U) Research accomplishments under this grant include: (1) demonstration of several laser-based real-time optical techniques for measuring vapor-particle-deposition rates onto cooled surfaces in combustion gases; (2) demonstration that thermophoresis dominates the capture of soot particles by thermocouples in laminar flames and that this phenomenon can be exploited to infer both local soot volume fractions and local gas temperatures; (3) development of effective boundary layer computational methods and correlations for thermophoretically-modified small particle transport across laminar and turbulent boundary layers; and (4) extension of the recently developed microwave induced plasma emission spectroscopic (MIPES) method to follow boron surface gasification kinetics. Seven presentations and eight publications describing these techniques/findings are documented. Keywords: Aerosols; convective diffusion; Deposition; Energy transfer; catalysis; fouling; soot.

DESCRIPTORS: (U) *COMBUSTION PRODUCTS, *ENERGY TRANSFER, *COMBUSTION, *SOOT, METHODOLOGY, OPTICS, REAL TIME, PHASE, PARTICLES, TRANSPORT PROPERTIES, TEMPERATURE, EMISSION, MICROWAVES, PLASMAS(PHYSICS), THERMOCOUPLES, TURBULENT

AD-A174 826

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 826 CONTINUED

AD-A174 825 .13 8/0

BOUNDARY LAYER, BORON, ENERGY CONVERSION, KINETICS, SURFACES, CATALYSIS, CONVECTION, DIFFUSION, DEPOSITION, FOULING, LAMINAR BOUNDARY LAYER, NUMERICAL METHODS AND PROCEDURES, COOLING, LAMINAR FLOW, AEROSOLS, REACTION KINETICS, LASER APPLICATIONS, DEPOSITION, PHASE TRANSFORMATIONS, VOLUME

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Effects of Assuming Independent Component Failure Times, If They Are Actually Dependent, in a Series System.

IDENTIFIERS: (U) Multiphase combustion, Thermophoresis, WJAFOSR2308A2, PE61102F

DESCRIPTIVE NOTE: Annual rept. 1 Oct 84-31 Oct 85.

NOV 85 132P

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

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-88-2042

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this proposal is to investigate the robustness to departures from independence of methods currently in use in reliability studies when competing failure modes or competing causes of failure associated with a single mode are present in a series system. The first specific aim is to examine the error one makes in modeling a series system by a model which assumes statistically independent component lifetimes when in fact the component lifetimes follow some multivariate distribution. The second specific aim is to assess the effects of the independence assumption on the error in estimating component parameters from life tests on series systems. In both cases, estimates of such errors will be determined via mathematical analysis and computer simulations for several prominent multivariate distributions. A graphical display of the errors for representative distributions will be made available to researchers who wish to assess the possible erroneous assumption of independent competing risks. A third aim is to tighten the bounds on estimates of component reliability when the risks belong to a general dependence class of distributions (for example, positive quadrant dependence, positive regression dependence, etc.).

DESCRIPTORS: (U) *RELIABILITY, *SYSTEMS ANALYSIS.

AD-A174 826

AD-A174 825

UNCLASSIFIED

PAGE 98 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 825 CONTINUED

COMPUTER GRAPHICS, COMPUTERIZED SIMULATION, DISTRIBUTION, ESTIMATES, FAILURE, GRAPHICS, LIFE TESTS, MATHEMATICAL ANALYSIS, MULTIVARIATE ANALYSIS, PARAMETERS, QUADRANTS, REGRESSION ANALYSIS

IDENTIFIERS: (U) LPN-OSURF-714837, LPN-OSURF-763285, PE81102F, WJAF05R2304A5

AD-A174 820 .20 4/0

TORONTO UNIV DONNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) An Interferometric Investigation of the Regular to Mach Reflection Transition Boundary in Pseudostationary Flow in Air.

DESCRIPTIVE NOTE: Technical note.

APR 86 154P

PERSONAL AUTHORS: Wheeler, John ;

REPORT NO. UTIAS-TN-286

CONTRACT NO. AFOSR-82-0096

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2029

UNCLASSIFIED REPORT

ABSTRACT: (U) The regular (RR) to Mach reflection (MR) transition boundary in pseudostationary flow in air was investigated, with emphasis on the influence of the shock induced boundary layer. Nearly 100 experiments were conducted in the RR to MR transition line over a range of incident shock wave Mach number $1.1 \leq M_s < 6.5$ by conducting experiments in hypervelocity shock tube. The wedge angles used were 42, 45, 47, and 48 deg. Initial pressures were kept as low to maximize viscous effects and ranged from 0.4 kPa to 100 kPa. A comparison was made between the boundary layer thickness, and the deviation of the transition boundary from inviscid theory. This difference is called the von Neumann paradox. The von Neumann paradox is due to viscous effects. The deviation of the RR to MR transition line from the detachment criterion boundary was found to increase with a drop in initial pressure. The effect of the end was boundary layer on the RR to MR transition line was more pronounced at low Mach number ($M_s < 2$), and a model is proposed to explain this behavior. Initial pressure was also found to influence the height of the Mach stem in MR. Lower

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PAGE 97

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 820 CONTINUED

AD-A174 803 3 2/O.4 1/O.17 9/O

Initial pressure (with greater viscous effects) reduced the height of the Mach stem, which was found to be smaller than the inviscid prediction in all MR experiments. An explanation for the reduction in Mach stem height is suggested, but the causes was not thoroughly investigated. (Canada)

DESCRIPTORS: (U) *REFLECTION, *SHOCK WAVES, *BOUNDARY LAYER TRANSITION, BOUNDARY LAYER, THICKNESS, HYPERSONIC VELOCITY, SHOCK TUBES, INVISCID FLOW, CANADA, INTERFEROMETRY, TRANSITIONS, MACH NUMBER, REYNOLDS NUMBER

IDENTIFIERS: (U) Pseudostationary flow, WUAFOSR2307A1, PEG1102F

SRI INTERNATIONAL MENLO PARK CA

(U) The Analysis Phase of MITHRAS.

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

JUN 86 134P

PERSONAL AUTHORS: Wickwar, Vincent B. ; De La Beaujardiere, Odile ; Leger, Carol A. ;

CONTRACT NO. F49620-83-K-0005

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-88-2037

UNCLASSIFIED REPORT

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

ABSTRACT: (U) MITHRAS is a coordinated multiradar program to study the upper atmosphere. Its purpose is to examine the interactions among the magnetosphere, ionosphere, and thermosphere, as well as the phenomena that result from these interactions. It is based around a data set acquired by the Chatanika, Millstone Hill, and EISCAT Incoherent-scatter radars between May 1981 and June 1982. A larger portion of this period was unique because it was the only time that three radars, well separated in local and magnetic time, operated together to probe the high-latitude region. The period was also unique because it coincided closely with solar maximum and the DE-2 spacecraft was available for correlative observations. To learn as much as possible from the observations, several tools were developed to improve the handling and analysis: a data-exchange tape format was developed, new display methods using color were implemented to present the data, F-region analysis procedures were extended, and binning procedures were developed to facilitate statistical analysis of the data. In addition, workshops were held so that the observations could be discussed and interpreted by the MITHRAS participants.

AD-A174 820

AD-A174 803

UNCLASSIFIED

PAGE 98 EVJ56L

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 803 CONTINUED

AD-A174 802 .13 13/0

DESCRIPTORS: (U) *MAGNETOSPHERE, *THERMOSPHERE, *UPPER
ATMOSPHERE, *RADAR, F REGION, INCOHERENT SCATTERING,
IONOSPHERE, MAGNETIC FIELDS, STATISTICAL ANALYSIS, TIME,
WORKSHOPS

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL
SYSTEMS

(U) The Identification of a Distributed Parameter Model
for a Flexible Structure,

IDENTIFIERS: (U) WUAFOSR2310A2

AUG 88 48P

PERSONAL AUTHORS: Banks, H. T. ; Gates, S. S. ; Rosen, I. G. ;
Wang, Y. ;

REPORT NO. LCDS-86-32

CONTRACT NO. AFOSR-84-0393

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-2034

UNCLASSIFIED REPORT

ABSTRACT: (U) A develop a computational method is developed for the estimation of parameters in a distributed model for a flexible structure. The structure we consider (part of the 'RPL experiment') consists of a cantilevered beam with a thruster and linear accelerometer at the free end. The thruster is fed by a pressurized hose whose horizontal motion effects the transverse vibration of the beam. The Euler-Bernoulli theory is used to model the vibration of the beam and treat the hose thruster assembly as a lumped or point mass dashpot spring system at the tip. Measurements of linear acceleration at the tip are used to estimate the hose parameters (mass, stiffness, damping) and a Voigt-Kelvin viscoelastic structural damping parameter for the beam using a least squares fit to the data. Spline based approximations are considered to the hybrid (coupled ordinary and partial differential equations) systems; theoretical convergence results and numerical studies with both simulation and actual experimental data obtained from the structure are presented and discussed.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, MATHEMATICAL
MODELS, ACCELERATION, ACCELEROMETERS,
APPROXIMATION(MATHEMATICS), ASSEMBLY, CANTILEVER BEAMS,

AD-A174 803

AD-A174 802

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

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COMPUTATIONS, CONVERGENCE, DAMPING, DISTRIBUTION, ESTIMATES, HORIZONTAL ORIENTATION, HOSES, LINEAR SYSTEMS, LINEARITY, MODELS, MOTION, NUMERICAL ANALYSIS, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, PRESSURIZATION, SIMULATION, SPLINES(GEOMETRY), STIFFNESS, THRUSTERS, TRANSVERSE, VIBRATION

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Digital Cauer-Type Ladders for Stable Filters.

MAY 86 SP

PERSONAL AUTHORS: Bistritz, Yuval ;

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

CONTRACT NO. AFUSR-83-0228

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-86-2047

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE International Symposium on Circuits and Systems, p886-889 May 86.

ABSTRACT: (U) The stability of digital ladder filters related to LC Cauer ladder low-pass filters by Bruton's LDI transformation is studied. Necessary and sufficient conditions for the digital LDI Cauer filter to be lossless and for a corresponding doubly terminated filter to be stable are derived. A concurrence relation between the stability and sampling rate requirements is shown for implementations by switched capacitors, by which appropriate sampling rate generally guarantee also the sufficiency condition for stability. Keywords include: Digital ladder filters, LC Cauer ladder, Low-pass filters, LDI transformation. (Reprints)

DESCRIPTORS: (U) *DIGITAL FILTERS, *SAMPLING, *LOW PASS FILTERS, RATES, FILTERS, STABILITY, REPRINTS, REQUIREMENTS, CAPACITORS, SWITCHING

IDENTIFIERS: (U) WUAFOSR2304A8, PE61102F

AD-A174 802

AD-A174 800

UNCLASSIFIED

PAGE 100

EVJ58L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 792 .14 2/0.17 8/0.23 3/0 AD-A174 792 CONTINUED

SRI INTERNATIONAL MENLO PARK CA

(U) Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Sep 85-31 Aug 88.

OCT 88 21P

PERSONAL AUTHORS: Bahr, A. J.; Rosengreen, A. ;

CONTRACT NO. F49620-84-K-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2025

UNCLASSIFIED REPORT

ABSTRACT: (U) It has been demonstrated that small single-turn printed loops can be used as sensors with sufficient sensitivity to be useful in NDE and robotics and that printed-circuit techniques facilitate the fabrication of arrays of small loops to provide electronic scanning with high spatial resolution. It has also been shown that deconvolution techniques improve the spatial resolution of such sensors in detecting edges and slots. Future research plans under this contract include developing a model for inductive sensor arrays; designing and building a horizontal-loop array with vertical connections; demonstrating electronic scanning in one, and perhaps two, dimension; and exploring the possibilities of arraying drivers as well as sensors.

DESCRIPTORS: (U) *LOOPS, *NONDESTRUCTIVE TESTING, *ROBOTICS, *ARRAYS, *DETECTORS, ARRAYS, ELECTRONIC SCANNERS, PLANNING, RESOLUTION, SPATIAL DISTRIBUTION, DETECTORS, HIGH RESOLUTION, PRINTED CIRCUITS, CONTROL, ROBOTS

IDENTIFIERS: (U) PE811021F, WJAFOSR2308A2, LPN-SRI-7711

IAC NO. NT-035688

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

AD-A174 792

IAC SUBJECT TERMS: N--(U)SENSORS, ELECTROMAGNETIC TESTING, ARRAYS, ROBOTICS, CONTROL, IMAGING TECHNIQUES, SENSITIVITY, PRINTED CIRCUITS, DETECTION, RESOLUTION, DECONVOLUTION, FABRICATION, TEST EQUIPMENT, ELECTRONICS, SCANNING;

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 791

AD-A174 785 .1 3/0.11 4/0.20 4/0

NORTHWESTERN UNIV EVANSTON IL DEPT OF MECHANICAL
ENGINEERING

FAIRCHILD REPUBLIC CO FARMINGDALE NY

(U) Robust Asymptotic Tracking for Linear Systems with
Unknown Parameters.

(U) Optimum Aeroelastic Characteristics for Composite
Superaeroneuverable Aircraft.

86

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 85-31 May
86.

7P

PERSONAL AUTHORS: Schmitendorf, W. E. ; Barmish, B. R. ;

JUL 86 117P

CONTRACT NO. AFOSR-85-0051, NSF-ECS84-15591,

PERSONAL AUTHORS: Oyibo, Gabriel A. ; Weisshaar, Terrence A.

PROJECT NO. 2304

REPORT NO. AEO02V7407

TASK NO. A5

CONTRACT NO. F49620-85-C-0090

MONITOR: AFOSR

PROJECT NO. 2302

TR-86-2018

UNCLASSIFIED REPORT

TASK NO. 81

ABSTRACT: (U) This paper considers a tracking problem
for a linear system with uncertain parameters. The
objective is to design a state feedback controller so that
for all allowable parameter values, the system internally
stable and its output asymptotically tracks the command
reference input. A controller having this property is
termed a robust tracking controller. Conditions are given
which can be used to design a robust tracking controller.
The controller is linear with readily computable gains.
The results are illustrated with an example. Keywords:
Reprints; Uncertain systems; tracking; linear control
problems.

MONITOR: AFOSR
TR-86-2040

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *TRACKING, FEEDBACK, LINEAR SYSTEMS,
PARAMETERS, REPRINTS, CONTROL SYSTEMS

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A5

ABSTRACT: (U) In this preliminary investigation of an
aeroelastically-induced constrained warping phenomenon
for a composite (superaeroneuverable type) aircraft wing,
the wing is analytically modelled as a straight flat
laminated plate using various forms of highly simplified
aerodynamic loads. The free vibrations and (stability
importance aspects are examined to obtain physical
insights and determine their importance and/or design
implications. An affine transformation concept and a non-
dimensionalization scheme were used and an evolution of
effective warping parameters with which to study this
phenomenon was performed. The virtual work theorem and
variational principles were used to derive the equations
of motion based on the assumed wing displacements. Closed
form solutions to the uncoupled versions of these
equations were examined with the following results: 1)
Incorrect modelling of the warping phenomenon can lead
to errors in excess of 80% for the analytically predicted
aeroelastic characteristics of composite aircraft wings;
2) accurate modelling of the warping phenomenon is
particularly important for wings with mass coupling or
elastic coupling (e.g., wings aeroelastically tailored

AD-A174 791

AD-A174 785

UNCLASSIFIED

PAGE 102

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 785 CONTINUED

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using elastic coupling) and for higher vibration modes; 3) neglect of the warping constraint can result in either under- or overpredicted analytical results and lead to incorrect identification of aeroelastic divergence modes. The existence of closed-form free vibrations solutions for composite wings with elastic coupling and constraint of warping was established.

DESCRIPTORS: (U) *AEROELASTICITY, *COMPOSITE AIRCRAFT, *COMPOSITE WINGS, *VIBRATION, AIRCRAFT, WINGS, COUPLING(INTERACTION), ELASTIC PROPERTIES, EQUATIONS OF MOTION, SOLUTIONS(GENERAL), EQUATIONS, FLAT PLATE MODELS, MANEUVERABILITY, COMPOSITE MATERIALS, TRANSFORMATIONS(MATHEMATICS), BENDING, FLUTTER, MASS, AERODYNAMIC LOADING, SIMPLIFICATION, OPTIMIZATION, VARIATIONAL PRINCIPLES, DISPLACEMENT

IDENTIFIERS: (U) Supermaneuverable aircraft, Aeroelastic tailoring, Unsteady aerodynamics, Structural dynamics, Affine transformations, PE61102F, WUAFDSR230281

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF METALLURGY AND MATERIALS SCIENCE

(U) A Fundamental Study of the Bonding of Thermal Barrier Coatings.

DESCRIPTIVE NOTE: Final (annual) rept. 15 Jun 82-30 Nov 85.

JUN 86 70P

PERSONAL AUTHORS: MITCHELL, T. E. ; HEUER, A. H. ;

CONTRACT NO. AFOSR-82-0227

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-2013

UNCLASSIFIED REPORT

ABSTRACT: (U) Two layer thermal barrier coatings are currently being developed for extending the performance of nickel base superalloy gas turbine engines. The best materials reported to date comprise a Ni-Cr-Al-Y bond coat and a Y2O3 partially stabilized ZrO2 (Y-PSZ) thermal barrier coat. The Y level of both the bond coat and the thermal barrier coat have been studied empirically but the fundamental factors that govern optimization of the thermal barrier system are not well understood. Optimized systems perform remarkably well during high temperature exposure and thermal cycling but failure still tends to occur by radial cracking in the ceramic coat and circumferential cracking at the various metal/ceramic interfaces. Two fundamental aspects of the behavior are discussed: firstly, phase stability in the zirconia-yttria system itself, particularly the desirable tetragonal phase, and secondly, the nature of the important zirconia-alumina interface which forms during oxidation of the underlying bond coat. The results of this research are described briefly below and in the various appendices.

DESCRIPTORS: (U) *CERAMIC COATINGS, *METAL COATINGS, *BARRIER COATINGS, EXPOSURE(GENERAL), HIGH TEMPERATURE.

AD-A174 785

AD-A174 784

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PAGE 103

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 784 CONTINUED

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OPTIMIZATION, OXIDATION, CRACKING(FRACTURING), RADIAL STRESS, THERMAL INSULATION, CYCLES, HEATING, CERAMIC MATERIALS, INTERFACES, METALS, PHASE, STABILITY, THERMAL INSULATION, NICKEL ALLOYS, CHROMIUM, ALUMINUM, YTTRIUM, SUPERALLOYS, GAS TURBINES

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Bifurcations into Pathology for Hamiltonian Systems.

IDENTIFIERS: (U) PE61102F, WJAFOSR2306A2

JAN 86 79P

PERSONAL AUTHORS: Mischalkow, Konstantin ;

REPORT NO. LCDS-86-24

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

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2033

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper presents a geometric analysis of bifurcations leading to chaos for Hamiltonian systems with two degrees of freedom of the form $\dot{x} = y$, $\dot{y} = -\text{gradient } V(x)$. Two bifurcation parameters are considered. One is the energy level and the other is an angle, ψ , between two homoclinic orbits. Though global non-linearities are necessary, the results are obtained by local analysis of the flow near the origin where it is assumed that $(D^2V)(0) = I$, the 2×2 identity matrix. For a fixed energy level it is shown that as ψ decreases through 90° the two homoclinic orbits bifurcate into two homoclinic orbits, a periodic orbit, and connecting orbits. These orbits can then be used to define a compact region in R^4 . Now treating the energy as a parameter the trajectory of orbits passing through this compact region can be described using symbolic dynamics. In this case it is shown that a single periodic orbit bifurcates into three periodic orbits whose stable and unstable manifold intersect transversely.

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), ENTROPY, TRAJECTORIES, DEGREES OF FREEDOM, DYNAMICS, ENERGY LEVELS, GLOBAL, HAMILTONIAN FUNCTIONS, JOINING, NONLINEAR SYSTEMS, ORBITS, PARAMETERS, STABILITY, TRAJECTORIES, VALUE

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AD-A174 781

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PAGE 104 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

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IDENTIFIERS: (U) *Manifolds(Mathematics), Homoclinic
orbits, chaos

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE AND
PLASMA DYNAMICS LAB

(U) Fluid Dynamic - Structural Interactions of Labyrinth
Seals.

DESCRIPTIVE NOTE: Final rept. 1 Dec 83-31 Dec 84.

AUG 88 40P

PERSONAL AUTHORS: Martinez-Sanchez, Manuel ;Dugundji, John ;

CONTRACT NO. AFOSR-83-0034

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2039

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is described on a continuing investigation into the fluid dynamic and structural interactions of labyrinth seals. Three major areas are considered namely, (a) design and construction of a realistic labyrinth seal test rig to measure stiffness and damping forces in seals, (b) further development of an analytic labyrinth seal test model and its characteristics, and (c) formulation of a structural dynamic rotor system model including labyrinth seal forces and their application to the High Pressure Fuel Turbopump of the Space Shuttle main engine. Keywords: Labyrinth Seals; Force Coefficients; Rotor Dynamics.

DESCRIPTORS: (U) *SEALS(STOPPERS), COEFFICIENTS, DAMPING, DYNAMICS, FLUID DYNAMICS, FLUIDS, FUELS, HIGH PRESSURE, INTERACTIONS, LOADS(FORCES), ROCKET ENGINES, ROTORS, SPACE SHUTTLES, STIFFNESS, STRUCTURES, TEST EQUIPMENT, TURBOPUMPS, TURBOMACHINERY

IDENTIFIERS: (U) *Labyrinth seals, PEG1102F,
WUAFOSR230281

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PAGE 105 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 777 .12 3/0

AD-A174 773 .5 8/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

ROCKEFELLER UNIV NEW YORK

(U) Tests Conditional on Imbalance with Biased Coin Designs.

(U) Visual Temporal Filtering and Intermittent Visual Displays.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Final progress rept. 1 Sep 84-30 Jun 86,

JUL 86 22P

AUG 86 8P

PERSONAL AUTHORS: Hollander, Myles ; Pena, Edsel ;

PERSONAL AUTHORS: Shapley, Robert ;

REPORT NO. FSU-STATISTICS-W734, TR-86-189-AFOSR

CONTRACT NO. AFOSR-84-0278

CONTRACT NO. F49820-85-C-0007

PROJECT NO. 2313

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-86-2026

MONITOR: AFOSR
TR-86-2019

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Distributional properties of the treatment assignment variables T sub $1, \dots, T$ sub n under Efron's (1971) biased coin design are derived. These properties are conditional on the terminal imbalance of the treatment allocation. Recursive procedures are presented for obtaining the conditional moments of T sub $1, \dots, T$ sub n . Based on these results, large-sample test statistics are proposed for the randomization test of the null hypothesis of no treatment difference. In contrast to Efron's test statistic, the approximations herein proposed are applicable when there is a treatment allocation imbalance. Keywords: markov chains; chemical tests; conditional means and covariances; computerized simulation.

DESCRIPTORS: (U) *RECURSIVE FUNCTIONS, *BIOSTATISTICS, *MARKOV PROCESSES, BIAS, CHEMICAL ANALYSIS, HYPOTHESES, NULLS(AMPLITUDE), COMPUTERIZED SIMULATION, MOMENTS, COVARIANCE, STATISTICAL TESTS

IDENTIFIERS: (U) Markov chains, Coin design, PE61102F, WJAFOSR2304A5

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UNCLASSIFIED

PAGE 106 EVJ56L

ABSTRACT: (U) The initial objective of this project was to investigate the relation between the temporal filtering properties of visual neurons and the performance of human observers when they view intermittent visual displays, e. g. video screens. The scope of the project was reduced by the support level set by AFOSR to focus just on human observers and to omit any experiments on neurons in experimental animals. Specific aims of the project initially included the design and fabrication of a variable-raster-rate electro-optic display, and the use of this novel device to measure the contrast sensitivity function at different raster rates. These two specific aims have been reached and are described in the full report.

DESCRIPTORS: (U) *VISUAL AIDS, *PSYCHOPHYSICS, ANIMALS, FILTERS, DISPLAY SYSTEMS, RASTERS, RATES, NERVE CELLS, VISION, CONTRAST, SENSITIVITY, HUMANS, OBSERVERS, PERFORMANCE(HUMAN)

IDENTIFIERS: (U) PE61102F, WJAFOSR2313A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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IOWA UNIV IOWA CITY

(U) Support of the International Laser Science Conference
(1st) Held in Dallas, Texas on 18-22 November 1985.

DESCRIPTIVE NOTE: Final rept. 8 Nov 85-7 May 86.

MAY 86 5P

PERSONAL AUTHORS: Stwalley, William C. ;

CONTRACT NO. AFOSR-86-0080

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFUSR
TR-86-2021

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser Science is an emerging technical area with a strong interdisciplinary flavor. It is based on atomic and molecular physics, chemical physics, condensed matter physics, optical physics and engineering, plasma physics, physical chemistry, photochemistry, materials science and engineering, electrical engineering, gaseous electronics, quantum electronics, and electro-optics. At the core of laser science are the mechanisms of the lasers themselves and the interaction of the laser photons with matter (spectroscopy and photoprocesses). Surrounding this core is the wide spectrum of scientific applications of lasers, not only in the disciplines mentioned above, but also in virtually every other area of science and technology. The primary purpose of the conference is to survey annually both the laser and spectroscopy/photoprocesses core areas and a wide variety of selected scientific applications of lasers.

DESCRIPTORS: (U) *LASER APPLICATIONS, PHYSICS, ELECTRICAL ENGINEERING, ELECTRONICS, GASES, LASERS, MOLECULAR STRUCTURE, PHOTOCHEMICAL REACTIONS, SYMPOSIA, OPTICS, PHYSICAL CHEMISTRY, PLASMAS(PHYSICS), QUANTUM ELECTRONICS, SPECTROSCOPY

IDENTIFIERS: (U) Chemical physics, PE6110ZF,
WUAFOSR2301A1

AD-A174 788

AD-A174 785 .20 5/O.20 8/O

ARGONNE NATIONAL LAB IL

(U) The Gordon Research Conference on Electron Spectroscopy Held in Wolfboro, New Hampshire on 14-18 July 1986.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-31 Dec 86.

JUL 86 17P

PERSONAL AUTHORS: Dehmer, Joseph L. ;Pierce, Daniel T. ;

CONTRACT NO. AFOSR-86-0188

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-2023

UNCLASSIFIED REPORT

ABSTRACT: (U) The scope of the electron spectroscopy conference covers a range of modern techniques too numerous to mention, including various combinations of excitation sources (synchrotron radiation, laser radiation, electron beams, heavy ion beams, metastable atoms, etc.), targets (free atoms and molecules, adsorbed atoms and molecules, clusters, surfaces, solids, liquids and interfaces, etc.), and detectors (energy, ejection-angle, spin analyzers, often in coincidence with another observation channel, etc.). The conference it uses electron spectroscopy as common thread to draw together and focus diverse approaches to frontier research topics. Especially stimulating and fruitful exchanges occur across the gas phase/condensed matter boundary and between basic and applied sciences. The program is presented.

DESCRIPTORS: (U) *ELECTRON SPECTROSCOPY, ADATOMS, DETECTORS, LASER BEAMS, MOLECULES, SOLIDS, RADIATION, EXCITATION, SOURCES, ELECTRON BEAMS, HEAVY IONS, METASTABLE STATE, CHANNELS, OBSERVATION, ANALYZERS, PARTICLE ACCELERATOR TARGETS, PHASE TRANSFORMATIONS, SPIN STATES

IDENTIFIERS: (U) Program(Schedule).. WUAFOSR2301A4,

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PAGE 107 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 785 CONTINUED

PEG1102F

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ARGONNE NATIONAL LAB IL ENVIRONMENTAL RESEARCH DIV

(U) The Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 9-13 June 1986.

DESCRIPTIVE NOTE: Final rept..

JUN 86 18P

PERSONAL AUTHORS: Dehaer, Patricia M.; Johnson, Philip M.;

CONTRACT NO. AFOSR-88-0186

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-2022

UNCLASSIFIED REPORT

ABSTRACT: (U) The program covered all aspects of Multiphoton Processes in atoms and molecules. There were sessions devoted to multiphoton ionization of atoms, multiphoton ionization in intense laser fields, multiphoton ionization and dissociation processes in small molecules, multiphoton dissociation processes in larger molecules (including picosecond processes), and general interest sessions. The complete Conference program is appended.

DESCRIPTORS: (U) *PHOTODISSOCIATION, *LASER PUMPING, DISSOCIATION, MOLECULES, IONIZATION, PHOTONS, INTENSITY, SYMPOSIA, LASERS

IDENTIFIERS: (U) Multiphoton processes, Picosecond time, Program(Schedule), PEG1102F, WUAFOSR2301A4

AD-A174 785

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PAGE 108 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 763 .20 4/0.21 2/0

AD-A174 758 .12 3/0

CORNELL UNIV ITHACA NY

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Numerical Experiments on Turbulent Mixing.

DESCRIPTIVE NOTE: Annual rept. 16 Jan 85-15 Jan 86,

(U) On the Existence and Uniqueness of Invariant Measure for Continuous Time Markov Processes.

JUN 86 5P

APR 86 25P

PERSONAL AUTHORS: Pope, S. B. ;

PERSONAL AUTHORS: Stettner, Lukasz ;

CONTRACT NO. AFOSR-85-0083

REPORT NO. LCDS-86-18

PROJECT NO. 2308

CONTRACT NO. AFOSR-85-0315

TASK NO. A2

PROJECT NO. 2304

MONITOR: AFOSR

TASK NO. A1

TR-86-2045

MONITOR: AFOSR
TR-86-2032

UNCLASSIFIED REPORT

ABSTRACT: (U) In turbulent combustion, mixing by molecular transport is an essential process that is not well understood. Because mixing occurs on the smallest length and time scales it is difficult to study experimentally. Instead, we are starting a study based on the direct numerical simulation of turbulence, initially for a conserved passive scalar in homogeneous isotropic turbulence. The Eulerian velocity and scalar fields are calculated from the exact evolution equations, and both Eulerian and Lagrangian statistics are deduced from the computed fields. A particle tracking scheme, need to extract Lagrangian information, has been implemented and is undergoing testing. In addition, in order to study processes in stationary turbulence, a forcing algorithm has been developed and implemented, and is being tested.

DESCRIPTORS: (U) *MIXING, *TURBULENCE, *COMBUSTION, ALGORITHMS, EQUATIONS, EVOLUTION(GENERAL), MOLECULAR PROPERTIES, TRANSPORT PROPERTIES, PARTICLES, TRACKING, SCALAR FUNCTIONS, TURBULENT FLOW, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, HOMOGENEITY, ISOTROPISM, NUMERICAL METHODS AND PROCEDURES, PASSIVE SYSTEMS, SCALE, TIME, COMPUTERIZED SIMULATION, TIME SERIES ANALYSIS

IDENTIFIERS: (U) Turbulent combustion, Forcing algorithms, Turbulent mixing, Scalar mixing, PE81102F, WUAFOSR2308A2

AD-A174 763

UNCLASSIFIED

PAGE 109

EVJ56L

UNCLASSIFIED REPORT

ABSTRACT: (U) The paper attempt to find fairly general conditions under which the existence and uniqueness of invariant measure is guaranteed. The obtained results are new or generalize at least slightly known. The author introduces a terminology: weak, strong Harris, strong recurrence. Two Sections concern general standard processes. Are Section restricts it to Feller or strong Feller standard processes. Three examples are considered to illustrate possible unpleasant situations one can meet in general theory.

DESCRIPTORS: (U) *MARKOV PROCESSES, *INVARIANCE, CONTINUOUS PROCESSING, THEORY, TIME, TIME STUDIES

IDENTIFIERS: (U) Existence theorems, Uniqueness theorems, PE81102F

AD-A174 758

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 754 . 8 7/0.8 11/0.17 10/0 AD-A174 754 CONTINUED

SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA CA

(U) Analysis of MSS (Marine Seismic System) and OBS (Ocean Bottom Seismograph) Data Collected during the NGENDEI Seismic Experiment.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 83-30 Jun 86.

AUG 86 577P

PERSONAL AUTHORS: Orcutt, John A. ;

CONTRACT NO. AFOSR-84-0043, DARPA Order-4983

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-86-1091

UNCLASSIFIED REPORT

ABSTRACT: (U) Results of the data analysis employing data collected during the NGENDEI Seismic Experiment in the southwest Pacific Ocean are presented. This experiment tested the DARPA Marine Seismic System (MSS) and verified the improved signal-to-noise ratio achieved by burying the instrument within the oceanic crust. Generally, all the goals of the experiment were achieved. The experiment, which took place on the Deep Sea Drilling Project Leg 91, was designed to test the MSS in a realistic environment near an active submarine trench. The Scripps's ship, the R/V Melville, was used in addition to the D/V Glomar Challenger for tasks related to site surveying, ocean bottom seismograph (OBS) deployment and refraction shooting. Deployment of an autonomous recording package on the seafloor was successful. The OBS's launched several times during the course of the experiment operated correctly in all instances including the 45 day teleseismic recording phase at the end. The MSS recording packages as well as the six OBS's were recovered at the end of the experiment. The MSS was left in the borehole and the coaxial cable was terminated in a dummy load. The mooring system used for recovery was redeployed in the event a future experiment became necessary or desirable.

AD-A174 754

UNCLASSIFIED

PAGE 110

EVJ56L

DESCRIPTORS: (U) *MARINE GEOPHYSICS, *SEISMIC DATA, *DATA REDUCTION, SUBMARINE TRENCHES, GEOLOGICAL SURVEYS, ANALOG TO DIGITAL CONVERTERS, ADDITION, COAXIAL CABLES, DATA PROCESSING, DEEP OCEANS, DRILLING, MOORING, OCEAN BOTTOM, OCEANIC CRUST, SEISMIC WAVES, SEISMOLOGY, SIGNAL TO NOISE RATIO, SITES

IDENTIFIERS: (U) Ngendei Experiment, MSS (Marine Seismic System), WUAFOSR2309A1, PE81102F

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 752 .20 2/0.20 5/0 AD-A174 751 .20 4/0
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DAVEY LAB
NIELSEN ENGINEERING AND RESEARCH INC MOUNTAIN VIEW CA

(U) Energy- and Angle-Resolved Detection of Neutral Atoms
Desorbed from Ion Bombarded Single Crystals. Rh(111)
and p(2x2)O/Rh(111).

86 9P

PERSONAL AUTHORS: Winograd, N.; Koblitz, P. H.; Schlick, G. A.
; Singh, J.; Baxter, J. P. ;

CONTRACT NO. AFOSR-85-0028

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-87-0501

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Surface Science,
V178 PL817-L824 1986

ABSTRACT: (U) Measurements of energy- and angle-resolved
distributions of neutral atoms desorbed from ion-
bombarded single crystals are obtained using a novel
multiphoton resonance ionization scheme. Experimental
results are compared successfully to molecular dynamics
calculations of the ion/solid collision event. This
comparison suggests that the distributions from Rh (111)
are sensitive to the crystal structure of the top atomic
layer. Calculated distributions match experimental ones
when oxygen atoms are assumed to adsorb in 3-fold hollow
(c-site) bonding configurations.

DESCRIPTORS: (U) *RHENIUM, *SINGLE CRYSTALS, *ION
BOMBARDMENT, *DESORPTION, BONDING, CONFIGURATIONS, IONS,
SOLIDS, IONIZATION, PHOTONS, RESONANCE, ATOMS, OXYGEN,
CRYSTAL STRUCTURE, COMPUTATIONS, DYNAMICS, MOLECULAR
PROPERTIES, NEUTRAL, ATOMS, CHEMICAL BONDS, REPRINTS

IDENTIFIERS: (U) Ion molecular interactions, PE81102F,
WUAFOSR2303A2

AD-A174 752

UNCLASSIFIED

PAGE 111

EVJ56L

UNCLASSIFIED REPORT

ABSTRACT: (U) The physics of some problems that arise in
impinging jet flows have been investigated using a Very
Large Eddy Simulation (VLES) of the Navier Stokes
equations. The problems that have been examined include
the upwash fountain covered by the collision of two
wall jets, possible causes of a Reynolds number scaling in
the suck down phenomena and possible flow resonance. The
effects of heat were also studied. It was found that the
VLES technique can help explain certain aspects of jet
flows. Keywords: Jet Flows; Turbulence.

DESCRIPTORS: (U) *JET FLOW, HEAT, IMPINGEMENT, NAVIER
STOKES EQUATIONS, REYNOLDS NUMBER, SCALING FACTORS,
EDDIES(FLUID MECHANICS), SIMULATION, FLOW, RESONANCE,
TURBULENCE

IDENTIFIERS: (U) VLES(Very Large Eddy Simulation),
Upwash, WUAFOSR2307A1, PE81102F

AD-A174 751

PAGE 111

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 780 .8 11/0.21 4/0

AD-A174 749 .8 10/0.20 11/0

WRIGHT STATE UNIV DAYTON OHIO

APPLIED RESEARCH ASSOCIATES INC SOUTH ROYALTON VT NEW ENGLAND DIV

(U) A Study of the Toxicity of the Metabolites of the Cruise Missile Fuel JP-10 on Several Animal Species.

(U) Experimental and Theoretical Response of Multiphase Porous Media to Dynamic Loads.

DESCRIPTIVE NOTE: Final rept. (annual) 15 Sep 85-14 Sep 86.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Jul 85-1 Jul 86,

SEP 86 19P

AUG 86 297P

PERSONAL AUTHORS: Serve, M. P. ;

PERSONAL AUTHORS: Kim, Kwang J. ; Blouin, Scott E. ; Timlan, David A. ;

REPORT NO. WSU-85-042

CONTRACT NO. AFOSR-85-0350

REPORT NO. ARA-5967-86

PROJECT NO. 2312

CONTRACT NO. F49620-85-C-0102

TASK NO. A5

PROJECT NO. 2302

MONITOR: AFOSR

TASK NO. C1

TR-86-2028

MONITOR: AFOSR
TR-86-0665

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Groups of male and female Fischer 344 rats, C-57-BL mice and Syrian Golden hamsters were dosed with 5-hydroxy-JP-10 and 5-keto-JP-10, the metabolites of the cruise missile fuel JP-10, in order to study their toxicity. 5-Hydroxy-JP-10 proved to be an extremely toxic central nervous system depressant. The effects of 5-hydroxy-JP-10 on weight gain appeared to be most pronounced in the male rat. 5-keto-JP-10, because it is absorbed less readily than 5-hydroxy-JP-10, appeared to be relatively non-toxic. Neither of the JP-10 metabolites produced nephrotoxic effects in the doses administered.

ABSTRACT: (U) This report summarizes the current status of a combined experimental and theoretical investigation of the response of multiphase porous media to dynamic loading. This completes the first year of a planned three year investigation. Under the experimental portion, laboratory test were devised and conducted to measure the compressibility of soil and rock grains containing a large percentage of microporosity. Test were also developed to model liquefaction due to uniaxial strain loadings and to measure the amount of late-time consolidation as a function of the loading parameters. Finally, a test apparatus to measure fluid friction and energy absorption in porous media under specified flow conditions, including laminar, transient, and turbulent, was designed and constructed. This is currently undergoing evaluation. Under the theoretical portion of the work, derivations and computational algorithms to model the response of saturated soils and rocks to uniaxial and hydrostatic compressional loads were developed. The general purpose two-phase code TPDAPII was completely revised to include more realistic plastic and elasto-plastic material models and more efficient

DESCRIPTORS: (U) *JET ENGINE FUELS, *TOXICITY, *METABOLITES, MALES, RATS, DOSAGE, HAMSTERS, GAIN, WEIGHT, DOSE RATE, CNS DEPRESSANTS, MICE, KETONES, CRUISE MISSILES

IDENTIFIERS: (U) JP-10 fuel, Nephrotoxicity, Renal damage

AD-A174 750

AD-A174 749

UNCLASSIFIED

PAGE 112 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 749 CONTINUED

AD-A174 743 .12 3/0

computational algorithms. Lastly, theoretical derivations were completed for inclusion in the general purpose multiphase code MPDAP, to be written during the following year's effort.

DESCRIPTORS: (U) *SOIL MECHANICS, *DYNAMIC LOADS, *POROUS MATERIALS, POROSITY, PHASE, RESPONSE, SATURATION, SOILS, THEORY, AXES, STRAIN(MECHANICS), LIQUEFACTION, POROUS MATERIALS, TEST EQUIPMENT, COMPRESSIVE PROPERTIES, ALGORITHMS, COMPUTATIONS, MATHEMATICAL MODELS, DYNAMIC LOADS, CODING, ELASTIC PROPERTIES, PLASTIC PROPERTIES, FLOW, LABORATORY TESTS, FLUIDS, SATURATION, COMPUTER PROGRAMMING

IDENTIFIERS: (U) TPDAPII computer program, MPDAP computer program, WUAFOSR2302C1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Covariate Measurement Error in Logistic Regression.

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

85 18P

PERSONAL AUTHORS: Stefanski, Leonard A. ; Carroll, Raymond J.

CONTRACT NO. F19620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-2017

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Annals of Statistics, v13 n4 p1335-1351 1985.

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 reprint 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.

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

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

AD-A174 749

AD-A174 743

UNCLASSIFIED

PAGE 113

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 738 .12 3/0

AD-A174 738 .14 2/0

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF MATHEMATICS
STATISTICS AND COMPUTER SCIENCE

(U) Continuity of Gaussian Processes.

(U) Design of Experiments and Reliability Models.

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

DESCRIPTIVE NOTE: Final rept. 1 Jul 80-31 Jul 85,

AUG 86 25P

JAN 86 14P

PERSONAL AUTHORS: Samorodnitsky, Gennady ;

PERSONAL AUTHORS: Hedayat, A. ;

REPORT NO. TR-149

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 22304

PROJECT NO. 2304

TASK NO. A5

TASK NO. K3

MONITOR: AFOSR
TR-86-2043

MONITOR: AFOSR
TR-86-0379

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This document gives sufficient conditions for local continuity of the isonormal process L at some point of its parameter set. Since a Gaussian process, defined on a compact parameter space, that is a.s. continuous at each point is sample continuous, the result can be applied to the problem of general sample continuity of Gaussian processes. It is shown that sufficient conditions are strictly weaker than the classical sufficient conditions for sample continuity.

ABSTRACT: (U) This is a final report of scientific achievements and activities sponsored by U.S. Air Force Office of Scientific Research under contract AFOSR 80-0170 as of July 31, 1985. Research activities have been concentrated on two main areas: Design of experiments and Reliability. Research on design of experiments relates directly to problems of data collection and analysis relevant to virtually all scientific experiments. There is a strong need in the Air Force to reduce costs and save time in the collection and analysis of large amounts of data, such as communication, engineering, equipment testing, and aerospace medicine data. The reduction in costs and time should be done clearly without any damage to the statistical quality of the data being collected and analyzed. The research problems not only add to our store of knowledge about the multiple facets of data collection and data analysis in general, but these have immediate applications to many important problems with which the United States Air Force is faced. The main research emphasis has been to obtain designs which are efficient, easily applicable and yet meet the budgetary constraints.

DESCRIPTORS: (U) *STATISTICAL PROCESSES, GAUSSIAN QUADRATURE, PARAMETERS, CONTINUITY, ENTROPY, COVARIANCE, HILBERT SPACE

IDENTIFIERS: (U) *Isonormal processes, Metric entropy, PEB1102F, WUAFOSR2304A5

DESCRIPTORS: (U) *RELIABILITY, *EXPERIMENTAL DESIGN, MATHEMATICAL MODELS, AIR FORCE RESEARCH, DATA PROCESSING, AEROSPACE MEDICINE, COSTS, DATA ACQUISITION, QUALITY.

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AD-A174 738

UNCLASSIFIED

PAGE 114 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 736 CONTINUED

AD-A174 733 12 2/0

RELIABILITY, STATISTICS, TEST METHODS

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

IDENTIFIERS: (U) PE81102F, WUAF05R2304K3

(U) A Comparison of Stability and Convergence Properties of Techniques for Inverse Problems.

JAN 86 75P

PERSONAL AUTHORS: Banks, H. T.; Iles, D. W.;

REPORT NO. LCDS-86-3

CONTRACT NO. AFOSR-84-0398, NSF-MCS85-04316

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2036

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper demonstrates severe problems in some instances with using an unconstrained algorithm to estimate the parameter q . When modified, either by regularizing the problem using Tikhonov regularization or by constraining the estimate set the algorithm does give good estimates. Unlike the unconstrained algorithm, both the Tikhonov and constrained algorithms are stable with respect to increasing M while holding N fixed. However as N is increased the estimates from the Tikhonov algorithm do not improve as much as do those of the constrained algorithm. The Tikhonov estimates are biased by the regularization of the cost functional, and never show all the detail of q when q has significant variation. Both the constrained and Tikhonov estimation algorithms are stable with respect to systematic errors in the input data, while, except when N is large, the unconstrained algorithm fails to give good results on even the exact data. For both the Tikhonov and constrained algorithms there are parameters which affect the algorithm's performance. For the constrained algorithm suitable constraints must be found while for the Tikhonov algorithm suitable values of a and b must be found. The constrained algorithm has the advantage that the constraints used here, i.e. limits on the slope of q , have an obvious meaning, and so may well be known in

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 733 CONTINUED

advance. In the Tikhonov algorithm b and a have no obvious meaning. They must be suggested by looking at the change in the estimate behavior as b and a change, and perhaps using some apriori knowledge about the shape of q to choose values of b and a that give an estimate that is neither too flat, nor too oscillatory.

DESCRIPTORS: (U) *ALGORITHMS, *INVERSION, CONVERGENCE, INPUT, COMPARISON, STABILITY, ESTIMATES, PARAMETRIC ANALYSIS, COEFFICIENTS

AD-A174 728 .2 5/0.6 5/0

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Becton-Dickson Model 420 Fluorescence-Activated Cell Sorter (FACS).

DESCRIPTIVE NOTE: Final rept. 21 Dec 84-20 Dec 85.

MAY 86 9P

PERSONAL AUTHORS: Olsen, Richard G. ;

CONTRACT NO. AFOSR-85-0086

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-86-0389

UNCLASSIFIED REPORT

ABSTRACT: (U) The Epics 741 Single Laser System Flow Cytometer has and is being used in DOD projects entitled Immune Dysfunctions and Abrogation of the Inflammatory Response by Environmental Chemicals. The flow cytometry instrument is being used to evaluate the in vitro effects of unsymmetrical dimethyl hydrazine on the distribution and expression of T-lymphocyte subset antigens and Ia antigens.

DESCRIPTORS: (U) *LYMPHOCYTES, *IMMUNOLOGY, *IN VITRO ANALYSIS, *ANTIGENS, *DINETHYLHYDRAZINES, DYSFUNCTION, IMMUNITY, INFLAMMATION, RESPONSE(BIOLOGY), CHEMICALS, ENVIRONMENTS, VETERINARY MEDICINE

IDENTIFIERS: (U) Cytometers, Cytometry, T lymphocytes, LPN-OSURF-7645341718897, PE81102F, WJAFOSR2917A4

AD-A174 733

AD-A174 728

UNCLASSIFIED

PAGE 116

EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ59L

AD-A174 715 .20 1/0.20 12/0 AD-A174 715 CONTINUED

RENSELAER POLYTECHNIC INST TROY NY DEPT OF MECHANICAL
ENGINEERING AERONAUTICAL ENGINEERING AND MECHANICS

(U) Analytical Investigations of Bulk Wave Resonators in
the Piezoelectric Thin Film on Gallium-Arsenide
Configuration.

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

SEP 86 9P

PERSONAL AUTHORS: Tiersten, Harry F. ;

CONTRACT NO. AFOSR-84-0351

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR
TR-86-2035

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of earlier calculations of the quality factor of the piezoelectric thin film on semiconductor composite resonator due to radiation into the semiconductor wafer for the strip case both when trapping is and is not present are briefly discussed. Experimental verification of the results is noted. It is also noted that the direct calculation procedure is extremely cumbersome to use, but that it is required to check the accuracy of a perturbation procedure which is much easier to use. The perturbation procedure for the calculation of the quality factor of the composite resonator due to radiation into the semiconductor wafer is discussed and it is noted that the perturbation procedure enables calculations for the case of rectangular electrodes and diaphragms to be performed. It is further noted that for the strip case the calculations of the quality factor using the perturbation procedure are in good agreement with the results obtained from the earlier more cumbersome direct procedure. Keywords include: Piezoelectricity; Elasticity; Resonators; Bulk Waves; Thin Films; Semiconductor Wafers; Composite Resonators; Energy Trapping; Radiation; Quality Factor; Plate Vibrations.

IDENTIFIERS: (U) WJAFOSR2308B2, PE81102F

DESCRIPTORS: (U) *WAVE PROPAGATION, *PIEZOELECTRIC MATERIALS, *RESONATORS, *GALLIUM ARSENIDES, *SEMICONDUCTORS, *WAFERS, THIN FILMS, ACCURACY, COMPUTATIONS, NUMERICAL METHODS AND PROCEDURES, ENERGY, ELECTRODES, RECTANGULAR BODIES, ELASTIC PROPERTIES, CONFIGURATIONS, QUALITY

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 711

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AD-A174 703

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COLORADO UNIV AT BOULDER DEPT OF ASTROPHYSICAL PLANETARY
AND ATMOSPHERIC SCIENCES

VIRGINIA INST OF MARINE SCIENCE GLOUCESTER POINT

(U) Plasma Wave Turbulence and Electromagnetic Radiation
Caused by Electron Beams.

(U) A Thermodynamic Study of Solutions of Liquid
Hydrocarbon Mixtures in Water.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 85.

DESCRIPTIVE NOTE: Journal article.

SEP 85

10P

86

8P

PERSONAL AUTHORS: Goldman, Martin V. ;

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

CONTRACT NO. AFOSR-84-0007

REPORT NO. VIMS-CONTRIB-1315

PROJECT NO. 2301

CONTRACT NO. AFOSR-83-0036

TASK NO. A8

PROJECT NO. 2303

MONITOR: AFOSR
TR-86-2082

TASK NO. B2

MONITOR: AFOSR
TR-86-2027

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was completed on a program to understand the mechanisms by which mildly relativistic electron beams can generate microwave radiation when injected into plasmas. The chief phenomena found to be involved were (1) stimulation of Compton conversion of Langmuir waves excited by relativistic beams and (2) multiple Raman up conversion of radiation from pre-existing Langmuir turbulence. Numerical programs were developed for computing the evolution of beam excited Langmuir waves into strongly turbulent states. It was further experimentally determined that quiet plasmas with low level of ambient density fluctuations were necessary in order to obtain optimum radiation.

DESCRIPTORS: (U) *ELECTRON BEAMS, *PLASMAS (PHYSICS), *MICROWAVES, *ENERGY TRANSFER, CONVERSION, DENSITY, ELECTROMAGNETIC RADIATION, EXCITATION, NUMERICAL ANALYSIS, OPTIMIZATION, PLASMA WAVES, QUIET, RADIATION, RELATIVITY THEORY, STIMULATION (GENERAL), TURBULENCE, VARIATIONS, FREQUENCY CONVERSION, FREQUENCY MULTIPLIERS

IDENTIFIERS: (U) Langmuir waves, WUAFOSR2301A8, PE81102F

AD-A174 711

UNCLASSIFIED

PAGE 118 EVJ58L

AD-A174 703

SUPPLEMENTARY NOTE: Pub. in Geochimica et Cosmochimica Acta, v50 p1545-1548 1986.

ABSTRACT: (U) The hydrocarbon solution process in water was studied because it is important in environmental and geological situations. The aqueous solubility of binary hydrocarbon mixtures was determined (n-octane + 1-methylnaphthalene at 20 and 70 C; n-octane + ethylbenzene at 20 C and tetraline + methylcyclohexane at 20 C). Vapor-liquid equilibrium hydrocarbon phase activity coefficients for the above mixtures were also determined. Hydrocarbon activity coefficients in the aqueous phase were found not to be measurably reduced in the presence of hydrocarbon co-solutes. This indicates that the effects of aqueous phase solute-solute interactions can not be determined within the precision of water solubility measurements. The presence of a substantial amount of water in the liquid hydrocarbon phase at 70C did not significantly affect the hydrocarbon activity coefficients in the hydrocarbon phase. Activity coefficients estimated by the UNIFAC group-contribution method indicate that water in the hydrocarbon phase may not significantly affect hydrocarbon phase activity coefficients up to 150 C.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 703 CONTINUED

AD-A174 702

DESCRIPTORS: (U) *SOLUTIONS(MIXTURES), *THERMODYNAMIC PROPERTIES, *HYDROCARBONS, ACTIVATION, COEFFICIENTS, LIQUIDS, SOLUBILITY, MIXTURES, WATER, THERMOCHEMISTRY, MEASUREMENT, LIQUID PHASES, REPRINTS

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Optimal Control of Systems Possessing Symmetries.

NOV 84 5P

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

PERSONAL AUTHORS: Grizzle, Jessy W. ; Marcus, Steven I. ;

CONTRACT NO. F49620-82-C-0033, AFOSR-84-0089

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2024

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, VAC-29 n11 p1037-1040 Nov 84.

ABSTRACT: (U) It is shown that a symmetry in an optimization problem induces a decomposition of the optimal feedback control law into factors. One factor can be calculated algebraically and depends only on the symmetry; the other factor corresponds to a lower dimensional optimization problem. This gives a priori information about the structure of the optimal feedback control law and indicates a possible more efficient method for optimizing such systems. Keywords: Nonlinear systems; Reprints.

DESCRIPTORS: (U) *CONTROL THEORY, *CONTROL SYSTEMS, CONTROL, DECOMPOSITION, FEEDBACK, NONLINEAR SYSTEMS, OPTIMIZATION, REPRINTS, SIZES(DIMENSIONS), SYMMETRY, REPRINTS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 683 CONTINUED

AD-A174 683 .21 2/O.21 5/O
MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Dense-Spray Structure and Phenomena.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 85-14 Jul 86.

AUG 86 72P

PERSONAL AUTHORS: Parthasarathy, R. N. ; Sagar, A. ; Faeth, G. M.

CONTRACT NO. AFOSR-85-0244

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-1071

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes theoretical and experimental study of dense sprays. The work was divided into two phases: (1) an investigation of particle laden water jets; and (2) an investigation of large scale liquid jet in the atomization regime. The particle laden jet experiments involved nearly monodisperse glass particles in water injected into still water, to simulate phase density ratios typical of high pressure sprays. Preliminary findings suggest that the locally homogeneous flow approximation, where interphase transport rates are assumed to be infinitely fast, is more successful for this flow than was observed during earlier work with phase density ratios further from unity. This is encouraging for application of relatively simple locally homogeneous flow analysis to high-pressure combustion processes encountered in power and propulsion systems. Measurements of the atomization of the atomization of large scale liquid jets show the presence of an all liquid core which extends an appreciable distance from the injector (ca. 200 injector diameters) at atmospheric pressure conditions. The drop containing shear layer adjacent to this core exhibits some properties of a locally homogeneous flow, however, large drops were also formed at the liquid surface which probably depart from this behavior. Measurements of liquid volume fraction suggest relatively slow rates of turbulent mixing for the

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AD-A174 683

UNCLASSIFIED

PAGE 120

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low pressure conditions of present experiments.
DESCRIPTORS: (U) *WATER JETS, *ATOMIZATION, *SPRAYS, *COMBUSTION, BAROMETRIC PRESSURE, DROPS, GLASS, HIGH DENSITY, HIGH PRESSURE, HOMOGENEITY, LAYERS, LIQUID JETS, LOW PRESSURE, MIXING, PARTICLES, PHASE STUDIES, PROPULSION SYSTEMS, RATES, RATIOS, SHEAR PROPERTIES, SURFACES, TURBULENT FLOW, TWO PHASE FLOW, TRANSPORT PROPERTIES

IDENTIFIERS: (U) Turbulent mixing, WUAFOSR2308A2, PEB1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA PALO ALTO
RESEARCH LAB

IDENTIFIERS: (U) Lattice structures, PE61102F,
WUAFDSR230281

(U) Local-Global Interactions in the Transient Response of
Lattice-Truss Plates.

DESCRIPTIVE NOTE: Annual rept..

AUG 84 42P

PERSONAL AUTHORS: Regelbrugge, M. E. ; Park, K. C. ;

REPORT NO. LMSC-D878939

CONTRACT NO. F49620-83-C-0018

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-0452

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Feb 84.
Presented at the Structures, Materials and Dynamics
Conference (24th), 14-16 May 84.

ABSTRACT: (U) The transient response of lattice truss
plates is studied with emphasis on how the individual
lattice members dynamic characteristics influence with
transient response characteristics. When the lattice
members are modeled as bars, the transient responses are
dominated by the low frequency components that correspond
to the continuum thick plate case. However, when the
lattice members are modeled as slender beams to be more
realistic, the dynamic characteristics of the individual
lattice members significantly influence the global
transient response. The level of influence increases as
the member slenderness ratio increases. The results
underscore the importance of local high wave number modes
that must be treated satisfactorily both in passive and
active control of large lattice truss space structures.

DESCRIPTORS: (U) *MILITARY SATELLITES, *STRUCTURAL
RESPONSE, CONTROL, DYNAMICS, PARTS, PASSIVE SYSTEMS,
TRANSIENTS, TRUSSES, PLATES

AD-A174 688

AD-A174 688

UNCLASSIFIED

PAGE 121

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 667

6 1/0 6 4/0

AD-A174 662 .12 1/0.20 4/0

CALIFORNIA UNIV SAN FRANCISCO

CALSPAN UB RESEARCH CENTER BUFFALO NY*

(U) Cloning of the poly(ADP-ribose) Gene from Rat Liver.

(U) Viscous Interactions at Hypersonic Speed.

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

DESCRIPTIVE NOTE: Final rept. 17 Mar 84-Oct 86,

SEP 86 39P

SEP 86 54P

PERSONAL AUTHORS: Kun, Ernest ;

PERSONAL AUTHORS: Holden, Michael S. ; Lee, Jhin Ho ;

CONTRACT NO. AFOSR-85-0377

REPORT NO. CUBRC-86611

PROJECT NO. 2312

CONTRACT NO. F49620-84-K-0009

TASK NO. A5

PROJECT NO. 2307

MONITOR: AFOSR
TR-88-0439

TASK NO. A1

MONITOR: AFOSR
TR-88-2072

UNCLASSIFIED REPORT

ABSTRACT: (U) Inhibition of the nuclear enzyme poly (ADP-ribose) polymerase by substances that interfere with the DNA binding of the enzyme molecule profoundly inhibit cellular phenotypic changes (malignant transformation) induced either by non-toxic doses of ultimate carcinogens and more recently in an oncogene construct-containing cell line by steroid hormones. Enzyme inhibition in ontogenically stable cells had no measurable physiological effect as tested by cell growth or viability, thus the biological role of poly (ADP-ribose) polymerase seems to be confined to cells undergoing differentiation, development or oncogenesis that occurs without detectable cellular toxicity (no DNA damage).

DESCRIPTORS: (U) *GENES, *LIVER, *CLONES, *ENZYMES, STEROIDS, BIOLOGY, CELLS(BIOLOGY), GENETIC ENGINEERING, DAMAGE, DEOXYRIBONUCLEIC ACIDS, MOLECULES, INHIBITION, DOSAGE, TOXICITY, CARCINOGENS, CELLS, CONFINEMENT(GENERAL), HORMONES, CANCER, TRANSFORMATIONS, RATS, STABILITY

IDENTIFIERS: (U) ADP(Adenosine Diphosphate), ADP ribose polymers, Polymerases, PE61102F, WUAFOSR2312A5

AD-A174 667

UNCLASSIFIED

PAGE 122 EVJ58L

UNCLASSIFIED REPORT

ABSTRACT: (U) This work has been directed toward investigations of fundamental aerothermal phenomena in hypersonic flow, with particular emphasis on viscous/inviscid interaction phenomena. The experimental studies were conducted to examine the changes in the structure at the base of a hypersonic turbulent boundary layer as it is subjected to a strong self induced pressure gradient in regions of shock wave/boundary layer interaction. The initial phase of the theoretical program was directed toward summarizing existing techniques for obtaining Navier/Stokes solutions for laminar flow over flat plates in hypersonic flow. In the experimental program, surface and flow field measurements were made to examine the detailed flow mechanics associated with turbulent boundary layer separation over a large cone flare model at Mach 11, 13, and 16 for Reynold numbers up to 100 million. Solutions have been obtained to Navier-Stokes equations for the laminar flow over the leading edge of a sharp flat plate in Mach 16 flow for highly cooled wall conditions using a modified McCormack/Shang fully explicit formulation. To obtain a stable converged solution it was necessary to reduce the grid size close to the leading edge to the order of the mean free path, and typically 20,000 time steps were required to achieve convergence. However, once obtained, the solution was a

AD-A174 662

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 662 CONTINUED

good agreement with experiment.

DESCRIPTORS: (U) *AEROTHERMODYNAMICS, *HYPERSONIC FLOW, *TURBULENT BOUNDARY LAYER, *VISCOUS FLOW, BOUNDARY LAYER FLOW, BOUNDARY LAYER, COOLING, FLAT PLATE MODELS, FLOW, FLOW SEPARATION, GRIDS, HYPERSONIC VELOCITY, FLOW FIELDS, INTERACTIONS, INVISCID FLOW, LAMINAR FLOW, LEADING EDGES, MEAN FREE PATH, MEASUREMENT, MECHANICS, NAVIER STOKES EQUATIONS, PRESSURE GRADIENTS, SHARPNESS, VISCOSITY, SIZES(DIMENSIONS), STRUTURAL PROPERTIES, HEAT TRANSFER WALLS, SHOCK WAVES, REYNOLDS NUMBER.

IDENTIFIERS: (U) WUAFOSR2307A1, PE81102F

AD-A174 661 .11 5/0.20 11/0

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Damage Models for Delamination and Transverse Fracture in Fibrous Composites.

DESCRIPTIVE NOTE: Annual technical rept. 15 Feb 85-14 Feb 86.

MAR 86 62P

PERSONAL AUTHORS: Schapery, R. A. ; Lamborn, M. J. ; Tonda, R. D. ;

REPORT NO. MM-5034-86-8

CONTRACT NO. AFOSR-84-0068

PROJECT NO. 2302

TASK NO. 82

MONITOR: AFOSR
TR-86-1078

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental work on the deformation and fracture of fibrous composites with distributed damage is described. Emphasis is on establishing the existence of potentials analogous to strain energy and on using these so-called work potentials in fracture studies. The difference between changing damage and constant damage processes is accounted for by using multivalued work potentials. It was shown previously that these potentials lead to a path independent J integral for characterizing fracture. A recent study is described in which the J integral is used to determine fracture energy for delamination in double-cantilevered beam specimens with a large percentage of off-axis fibers; the results are compared with fracture energies found by standard methods (which to not account for effects of distributed damage). Discussed next are investigations of flat rectangular bar specimens and thin-walled tubes under axial and torsional loading. The limited amount of experimental data presently available on angle-ply laminates confirms the existence of a potential even when there are large increases in

AD-A174 661

AD-A174 662

UNCLASSIFIED

PAGE 123 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 861 CONTINUED

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microcracking. The Appendix contains copies of technical reports prepared during the project year and the abstract of a recently completed Ph.D. dissertation.

DESCRIPTORS: (U) *COMPOSITE MATERIALS. *FIBERS. FIBER REINFORCED COMPOSITES, REINFORCED PLASTICS, J INTEGRALS, LAMINATES, DEFORMATION, TORQUE, TORSION, CONSTANTS, DAMAGE, DISTRIBUTION, ENERGY, FRACTURE(MECHANICS), MICROCRACKING, MODELS, STANDARDIZATION, STRAIN(MECHANICS), TRANSVERSE

IDENTIFIERS: (U) Delamination, WJAFOSR230282, PE61102F

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Robust Optimum Invariant Tests of Covariance Structures Useful in Linear Models.

DESCRIPTIVE NOTE: Technical rept..

AUG 86 38P

PERSONAL AUTHORS: Das,Rita ;Sinha,Bimal K. ;

REPORT NO. TR-88-20

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-2054

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper investigates robust optimum invariant tests of some covariance structures that naturally arise in the context of robustness study in linear models. To describe this concept, let $(Y, X \text{ beta}, \sigma^2)$ be the assumed (probably incorrect) model while $(Y, X \text{ beta}, \sigma^2)$ be the correct model, resulting in the specification error in the dispersion matrix. Then it is well known that the BLUEs of all estimable linear parametric function A beta remain the same under both the models if and only if the following condition holds on the structure of V: $LX'VZ = 0$ where Z denotes a matrix of maximal rank satisfying the condition $Z'X = 0$. Our object is to test the null hypothesis that V possesses the structure based on samples on Y under the model $(Y, X \text{ beta}, \sigma^2)$ for a fixed design matrix X. This hypothesis is of considerable interest as its acceptance greatly simplifies determination of BLUEs of estimable linear parametric functions.

DESCRIPTORS: (U) *STATISTICAL TESTS. *COVARIANCE. STRUCTURES, LINEARITY, MATHEMATICAL MODELS, HYPOTHESES, MANUFACTURING, MATRICES(MATHEMATICS), OPTIMIZATION, PARAMETRIC ANALYSIS

AD-A174 861

AD-A174 859

UNCLASSIFIED

PAGE 124

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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STANFORD UNIV CA

IDENTIFIERS: (U) Robustness, PEG1102F, WUAFOSR2304A5

(U) Center for Automation and Manufacturing Science
Established at Stanford University.

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

DEC 85 225P

PERSONAL AUTHORS: Cannon, Robert H. ; Binford, Thomas O. ;
Meindl, James D. ;

REPORT NO. SP0-13649-01-0082

CONTRACT NO. F49620-82-C-0092

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-86-1074

UNCLASSIFIED REPORT

ABSTRACT: (U) A system of real time collision avoidance was implemented. The system is based on the use of potential functions around obstacles. An experimental manipulator programming system COSMOS using the method has been designed for the PUMA and demonstrated with obstacles detected by an MIC vision module. A dynamic simulator was implemented as a software equivalent of a robot arm. A new nonlinear and generalizable technique has been developed that will continually monitor the parameters of a robot arm to estimate continuously the inertial forces and friction in robot joints.

Contributions have been made toward the successor for ACRONYM the modeling system of successor is greatly generalized to include multiple naming, holes and set operations on volumes. Automatic Task Level Assembly Synthesizer (ATLAS) was advanced significantly in power and usability. Several portable versions of LISP have been developed & both utilized. Implementation of new edge operator, tests of shape from a shading algorithm, and experimentation toward building an active ranging device.

DESCRIPTORS: (U) *MANIPULATORS, *COMPUTER AIDED MANUFACTURING, COMPUTERIZED SIMULATION, AUTOMATION.

AD-A174 657

AD-A174 659

UNCLASSIFIED

PAGE 125 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 657 CONTINUED

FLEXIBLE STRUCTURES, DYNAMICS, SIMULATORS,
FORCE(MECHANICS), ROBOTS, OPERATION, COMPUTER PROGRAMS,
FRICTION, OPERATORS(PERSONNEL), COLLISION AVOIDANCE, REAL
TIME, JOINTS, VISION

IDENTIFIERS: (U) LISP programming language

IAC NO. MT-003635

IAC DOCUMENT TYPE: MTIAC - MICROFICHE --

IAC SUBJECT TERMS: T--(U)Robots, Automation, Collision
Avoidance, Vision(Machine), Manipulators, Tactile Sensors,
/Code D, /Code T, /Code X.;

AD-A174 652 13 12/O.21 2/0

PURDUE UNIV LAFAYETTE IND THERMAL SCIENCES AND
PROPULSION CENTER

(U) Fuel Spray Ignition by Hot Surfaces and Stabilization
of Aircraft Fires.

DESCRIPTIVE NOTE: Annual technical rept. 15 Nov 81-14 Nov
83 on Task 3.

NOV 85 58P

PERSONAL AUTHORS: Lefebvres, A. H. ; Murthy, S. N. ;
Skivffstad, J. G. ;

REPORT NO. LMS/AFOSR-COMB/83-3

CONTRACT NO. AFOSR-82-0107

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-0874

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) In Task I, the research primarily involved
refinement of the experimental apparatus, instrumental
measurement techniques, and acquisition of experimental
data. Special efforts were made to assure the reliability
of the measurements, including runs made to examine the
process of oxide formation when using pure nickel
surfaces. Experimental data were acquired for both liquid
kerosene (Jet-A) and gaseous commercial propane fuels
over a broad range of run conditions. Evaluation of the
results in the context of existing theories and
modifications of the CONCHAS-SPRAY code to model this
experimental system were also undertaken. In Task II, the
extensive experimental results on blowoff velocity,
obtained using both conventional Vee-gutter and single-
sided flameholders, provided the data base for an
analytical study of the factors governing the stability
characteristics of bluff-body flameholders. An equation
was derived for predicting blowoff velocity in terms of
flameholder size, flameholder blockage, ambient air

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UNCLASSIFIED

PAGE 126 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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AD-A174 646 13 8/0

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Markovian Shock Models, Deterioration Processes,
Stratified Markov Processes Replacement Policies.

DESCRIPTIVE NOTE: Final rept. 1 Jul 80-31 Dec 85.

DEC 85 25P

PERSONAL AUTHORS: Abdel-Hameed, M. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0371

UNCLASSIFIED REPORT

ABSTRACT: (U) Research topics included shock and wear processes, optimal maintenance and replacement policies, positive dependence of components, life distribution properties of devices, analysis of censored failure time data, and accelerated life testing of systems.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *APPLIED MATHEMATICS, *LIFE EXPECTANCY(SERVICE LIFE), ACCELERATED TESTING, LIFE TESTS, FAILURE, TIME, MARKOV PROCESSES, SHOCK, PARTS, WEAR, DETERIORATION, MAINTENANCE, OPTIMIZATION, POLICIES, REPLACEMENT

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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AD-A174 646

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PAGE 128

EVJ56L

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OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 652 CONTINUED

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pressure and temperature, and laminar flame speed. Predictions of blowoff velocity based on this equation showed excellent agreement with experimental values. In Task III, experimental studies were completed and results correlated for ventilation flow from surroundings into a cavity with a small internal flow. Extensive flow visualization studies were also undertaken for flow past a protrusion, including the case of a jet through the protrusion. These studies provided data on formation of vortices adjoining and over the protruberance and the nature of jet flow entrainment into them.

FORD AEROSPACE AND COMMUNICATIONS CORP PALO ALTO CA
(U) On First Passage Times and Differential Equations,

86 25P

PERSONAL AUTHORS: Wenocur, Michael L. ;

CONTRACT NO. F49620-86-C-0022

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0478

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *FLAME HOLDERS, *IGNITION, *AIRCRAFT FIRES, ACQUISITION, BLOWOFF, VELOCITY, EQUATIONS, FLOW VISUALIZATION, COMMERCIAL EQUIPMENT, FUELS, GASES, PROPANE, AIR PRESSURE, DATA BASES, HIGH TEMPERATURE, SURFACES, BLOCKING, FUEL SPRAYS, JET FLOW, KEROSENE, LIQUIDS, OXIDATION, NICKEL, INTERNAL, STABILIZATION, VENTILATION, LAMINAR FLOW, MEASUREMENT, METHODOLOGY, BLOWOFF, PREDICTIONS, VELOCITY, RELIABILITY, SIZES(DIMENSIONS), VORTICES

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A2

ABSTRACT: (U) Practical and theoretical considerations in computing first passage time statistics are considered. We are motivated by first passage times as models of failure times. In Section 1, the relevance of first passage time distributions as failure time models is indicated. Also, the spectral series expansion solution to the backward equation is introduced. In Section 2, algorithms for approximating $w(x,t)$ are obtained. In particular, the infinite spectral expansion of $w(x,t)$ is approximated by an n -term sub-expansion which matches the first $n-1$ moments. Proofs validating the spectral expansion and the related approximation scheme are given in the Appendix. In Sections 3 and 4, methods are given for obtaining the eigenvalues and first passage moments, necessary for computing approximations to $w(x,t)$. In Section 5, computational issues related to calculating the moment generating function are considered. Sections 6 and 7 include theoretical comments about first passage times. In particular, the moment generating function is shown to possess an interesting representation having exponential form (cf equations (7.1)). This exponential representation is related to asymptotic expansions used in analyzing perturbations of certain second-order differential equations.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *DIFFERENTIAL EQUATIONS, ALGORITHMS, EIGENVALUES, TIME, PERTURBATIONS, EXPANSION, SERIES(MATHEMATICS), EXPANSION, SPECTRA, MOMENTS, STATISTICS, MATHEMATICAL MODELS

AD-A174 652

AD-A174 648

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 629 CONTINUED

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) Further Studies in Estimation of Life Distribution Characteristics from Censored Data.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 85-31 May 86.

JUN 86 15P

PERSONAL AUTHORS: Padgett, K. J. ;

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2050

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objectives of this research have been the development of smooth nonparametric estimators of quantile functions from right-censored data and the further study of smooth density estimators from censored observations. In particular, kernel-type quantile estimators have been obtained under censoring which give better estimates of percentiles of the lifetime distribution than the usual product-limit quantile estimator. During the past year, asymptotic properties of these kernel quantile estimators have been developed, including asymptotic normality, consistency, and mean square convergence. In addition, a data-based procedure for selecting the bandwidth has been investigated using the bootstrap, and approximate confidence for the true quantile have been proposed using bootstrap estimates of the sampling distribution. Theoretical results on the optimal bandwidth selection for kernel density estimators under random right censorship have also been obtained. New results in several other problem areas were also developed. These included the study of linear empirical Bayes estimators, prediction intervals for the inverse Gaussian distribution, nonparametric hazard rate estimation under censoring, nonparametric inference for step-stress accelerated life tests under censoring, discrete failure models, simultaneous confidence

AD-A174 629

AD-A174 629

UNCLASSIFIED

PAGE 129

EVJ56L

intervals for pairwise differences of normal means, and optimal designs for comparing treatments with a control.

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, MATHEMATICAL PREDICTION, ACCELERATED TESTING, ASYMPTOTIC NORMALITY, BANDWIDTH, CENSORSHIP, CONFIDENCE LEVEL, CONFIDENCE LIMITS, CONVERGENCE, DISTRIBUTION, FAILURE, HAZARDS, INTERVALS, INVERSION, LIFE TESTS, MEAN, NORMAL DISTRIBUTION, OPTIMIZATION, RATES, SAMPLING, SELECTION

IDENTIFIERS: (U) *Quantile functions, *Quantiles, PE81102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 623

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Approximate and Local Linearizability of Nonlinear Discrete-Time Systems.

86

31P

PERSONAL AUTHORS: Lee, Hong-Gi ; Marcus, Steven I. ;

CONTRACT NO. F49602-82-C-0033, AFOSR-84-0089

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0551

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-EC584-12100.

ABSTRACT: (U) This document considers a single-input nonlinear discrete-time system of a certain form. Many authors have studied (local or global) linearization (Cheng et. al. 1985, Hunt and Su 1981, Jakubczyk and Respondek 1980, Krener 1973, Su 1982) and approximate linearization (Krener 1984) by state feedback and coordinate change for nonlinear continuous-time systems. This paper discusses necessary conditions and sufficient conditions for local linearization and approximate linearization by state feedback and coordinate change for nonlinear discrete-time systems. Other related work on nonlinear discrete-time systems can be found in (Grizzle 1985a, 1985b, Grizzle and Nijmeijer 1985, Monaco and Normand-Cyrot 1983a, 1983b). Keywords: Matrices(Mathematics).

DESCRIPTORS: (U) *LINEARITY, *NONLINEAR SYSTEMS, MONACO, COORDINATES, DISCRETE DISTRIBUTION, TIME, INPUT, THEOREMS, MATRICES(MATHEMATICS), FEEDBACK

IDENTIFIERS: (U) *Discrete time systems, WUAFOSR2304A1, PE81102F

AD-A174 623

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SEARCH CONTROL NO. EVJ56L

AD-A174 621 . 14 3/0.20 12/0

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

(U) Design and Fabrication of Submicron Magnetic Bubble Device Technology.

DESCRIPTIVE NOTE: Annual scientific rept. no. 2.

OCT 86 135P

PERSONAL AUTHORS: Kryder, M. H. ; Alex, M. ; Bauer, C. L. ; Campbell, R. O. ; Greve, D. W. ;

CONTRACT NO. AFOSR-84-0341

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-86-1075

UNCLASSIFIED REPORT

ABSTRACT: (U) Work was carried out on high density (16 to 64 Mbit/sq cm) magnetic bubble device technology. Highlights of the research include the successful fabrication of silicon MOSFETS on bubble garnet substrates and the development of ion implanted bubble devices utilizing 0.5um bubbles in garnets with isotropic magnetostriiction. In addition, studies of the effects of ion implantation on garnet lead to improved fabrication techniques for the 0.5um devices. Chips utilizing 1um bubbles were demonstrated to have about 8% bias field margins at 50 Oe drive, and a numerical model was developed to model current accessed ion implanted devices. Keywords Include: Bubble Memory, Ion Implantation, Garnet, Silicon-on-Insulator, and Silicon-on-Garnet.

DESCRIPTORS: (U) *BUBBLE MEMORIES, *MOSFET SEMICONDUCTORS, *SILICON, *ION IMPLANTATION, BUBBLES, GARNET, SUBSTRATES, FABRICATION, METHODOLOGY, HIGH DENSITY, MATHEMATICAL MODELS

IDENTIFIERS: (U) WUAFOSR2305C1, PE81102F

AD-A174 621

PAGE 130

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 820 .9 1/0.14 2/0.17 8/0 AD-A174 820 CONTINUED

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.

IAC SUBJECT TERMS: N--(U)SENSORS, ELECTROMAGNETIC TESTING, ROBOTICS, CONTROL, ARRAYS, FILTERS, RESPONSE, TEST EQUIPMENT, RESEARCH, ANTENNAS, SIGNAL PROCESSING, PROBES, METALS, DIELECTRICS, MATERIALS, PROPERTIES, RESOLUTION, SIZES(DIMENSIONS);

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

OCT 86 25P

PERSONAL AUTHORS: Auld, B. A.; Gimple, M. ;

CONTRACT NO. F49620-84-C-0095

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-1073

UNCLASSIFIED REPORT

ABSTRACT: (U) Capacitive sensor arrays have been developed for multifunction sensing in robotic applications. The arrays consist of one-dimensional arrays of strip electrodes. They can be addressed to provide the different functions enumerated in 18. Distance ranging, edge detection, response optimization, and matched filtering have all been demonstrated experimentally with metal samples. Edge detection has been observed with dielectric samples, which cannot be sensed with inductive probes. Keywords include: Sensors, Robotics, Capacitive, Arrays, Distance Ranging, Edge detection, Response Optimization, Field Adaptation, Pattern Matching, Matched Filtering, Analytic Modeling.

DESCRIPTORS: (U) *DETECTION, *ARRAYS, *NONDESTRUCTIVE TESTING, *MATCHING, *DETECTORS, *ELECTRODES, MATHEMATICAL MODELS, EDGES, ADAPTATION, METALS, SAMPLING, ONE DIMENSIONAL, OPTIMIZATION, RESPONSE, ROBOTICS, DIELECTRICS, MATCHED FILTERS, ROBOTS

IDENTIFIERS: (U) WUAFOSR2308A2, PE81102F

IAC NO. NT-035686

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

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AD-A174 608 .20 1/0.21 2/0.21 5/0 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L
AD-A174 608 CONTINUED

CALIFORNIA INST OF TECH PASADENA

(U) Mechanisms of Exciting Pressure Oscillations in Ramjet Engines.

DESCRIPTIVE NOTE: Annual rept. Sep 85-Sep 86.

86 23P

PERSONAL AUTHORS: Marble, Frank E. ;

CONTRACT NO. AFOSR-84-0286

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0988

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past two years, we have been able to understand, in principle, the mechanism of one predominant mode of combustion instability in dump combustors for ramjet engines. The objectives of further experiments have been to provide a quantitative, physical basis for elements of this mechanism which will allow application of the results to a wide class of combustor sizes, fuels and mixture ratios, and to more complex acoustic environments. One mode of unsteady combustion in dump burners, which under certain circumstances may lead to combustion instability, involves the periodic formation of a large vortex in the separated shear layer and its subsequent movement toward the combustor wall. When oscillations appear, the frequency of the vortex shedding coincides with that of some natural acoustic mode of the apparatus. Detailed experiments show that the heat release which drives the oscillation occurs predominantly as the result of an interaction between this vortex and the wall. Recent experiments and calculations have shown that the time delay between vortex formation and the wall encounter is strongly dependent on the pressure amplitude of the oscillation and, consequently, an acoustic mode of particular frequency will be excited to an amplitude required to produce the suitable phase of the heat release. Experiments have been performed to assess the role of

chemical time in the overall time delay. The results provide means for using the results for different mixture ratios and fuel types. Keywords: Combustion, Instability, Pressure oscillations.

DESCRIPTORS: (U) *COMBUSTORS, *COMBUSTION STABILITY, *RAMJET ENGINES, OSCILLATION, AMPLITUDE, PRESSURE, LAYERS, SEPARATION, SHEAR PROPERTIES, VORTICES, CHEMICALS, TIME, DELAY, TIME INTERVALS, VORTEX SHEDDING, ACOUSTICS, COMBUSTORS, SIZES(DIMENSIONS), ENVIRONMENTS, FUELS, RATIOS, WALLS, RELEASE

IDENTIFIERS: (U) Unsteady combustion, Dump combustors, WUAFOSR2308A2, PEB1102F

AD-A174 608

AD-A174 608

UNCLASSIFIED

PAGE 132

EVJ56L

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 804 CONTINUED

IDENTIFIERS: (U) PE81102F, WUAFOSR2304K3

AD-A174 804

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

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

DEC 85 9P

PERSONAL AUTHORS: Baccelli, Francois ; Trivedi, Kishor S. ;

CONTRACT NO. AFOSR-84-0132, NSF-MCS-83-0200

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-0744

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Operations Research Letters,
v4 n4 p181-188 Dec 85.

ABSTRACT: (U) Consider a single server first in first out queue in which each arriving task has to be completed within a certain period of time (its deadline). more precisely, each arriving task has its own deadline - a non-negative 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 main concerns 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. Keywords: queues with breakdown; real time systems; transient analysis; reprints.

DESCRIPTORS: (U) *QUEUEING THEORY, *REAL TIME, AIRCRAFT, MISSIONS, TIME, REPRINTS, TELECOMMUNICATIONS, RESPONSE, TRANSIENTS, METHODOLOGY, PROBABILITY, REACTION TIME, SYSTEMS ANALYSIS, RELIABILITY(ELECTRONICS)

AD-A174 804

AD-A174 804

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 802 CONTINUED

WEA CAMBRIDGE MA

(U) Dynamic Analyses of Two-Dimensional Lattices.

DESCRIPTIVE NOTE: Technical rept. 1 Apr 83-1 Aug 84,

AUG 84 138P

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

CONTRACT NO. F49620-83-C-0092

PROJECT NO. 2307

TASK NO. 81

MONITOR: AFOSR
TR-88-2070

UNCLASSIFIED REPORT

ABSTRACT: (U) The dynamic properties of two two dimensional lattice structures for large space structures were investigated both analytically, using the COSMIC NASTRAN finite element code, and experimentally, using an HP3451C Fourier analyzer, its accompanying modal analysis software, and a procedure called experimental modal analysis. One of the lattices was composed of five identical repeating substructures (5 bay beam). The other lattice was composed of twenty two identical repeating substructures (22 bay beam). For a frequency range extending from 0 Hz to 20 kHz, the NASTRAN analyses identified approximately 180 natural frequencies and mode shapes for each of the structures. The experimental modal analyses (limited by the frequency content of the impact excitation force) identified 34 mode shapes and natural frequencies of the 5-bay beam, and 18 mode shapes and 30 natural frequencies of the 22-bay beam. The COSMIC NASTRAN-predicted natural frequencies and the natural frequencies measured using experimental modal analyses agreed to within seven percent. The NASTRAN frequencies were consistently lower than those measured using the Fourier analyzer, probably because of inaccuracies in the finite element modeling of the intersections of the substructures. The Fourier analyzer also generated modal parameters (natural frequencies, damping ratios, and complex residues) for the two structures. In general,

AD-A174 802

UNCLASSIFIED

PAGE 134 EVJ58L

these parameters can be used to predict the impulse response, $h(t)$, of a structure.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *MILITARY SATELLITES, *STRUCTURAL ANALYSIS, ANALYZERS, CODING, COMPUTER PROGRAMS, DAMPING, DYNAMICS, EXCITATION, FOURIER ANALYSIS, FREQUENCY, IMPACT, MATHEMATICAL MODELS, PARAMETERS, RANGE(EXTREMES), RATIOS, RESIDUES, RESONANT FREQUENCY, RESPONSE, SPACECRAFT, STRUCTURES, DYNAMIC LOADS, IMPULSE LOADING, VIBRATION

IDENTIFIERS: (U) NASTRAN computer program, COSMIC NASTRAN computer program, Lattice structures, PE81102F, WUAFOSR230781

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 801 CONTINUED

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Isomers and Excitation Energies of C sub 4.

MAR 86 8P

PERSONAL AUTHORS: Magers, David H.; Harrison, Robert J.;
Bartlett, Rodney J.;

CONTRACT NO. AFOSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0390

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v84
n8 p3284-3290, 15 Mar 86.

ABSTRACT: (U) Coupled-cluster (CC) and many-body perturbation theory (MBPT) studies of the rhombic and linear structures of C₄ are reported. For each isomer, the electronic spectra is obtained, and comparisons are made with experimental matrix-isolated ESR and electronic spectra. The closed-shell superscript 1 A sub q rhombic ground state is found to be more stable than the superscript 3 sigma sub g(-) state of the linear isomer by 5 kcal/mol at the highest level of calculation performed (CCSDT-1). However, the predicted spectrum for linear C₄ is in reasonable agreement with the observed results. An allowed electronic transition for the rhombus is predicted to lie in the same region, suggesting the possibility that both isomers could coexist in the experiment. Finally, vibrational frequencies for the rhombic isomer are calculated using analytical second-order MBPT second derivatives to aid in the experimental identification of this transient species.

DESCRIPTORS: (U) *MOLECULAR ISOMERISM, *EMISSION SPECTRA, *STELLAR ATMOSPHERES, *CARBON, ENERGY, EXCITATION, N BODY PROBLEM, PERTURBATION THEORY, FREQUENCY, VIBRATION, ELECTRON TRANSITIONS, COMPUTATIONS, RHOMBUS, STRUCTURES, TRANSIENTS, ELECTRON SPIN RESONANCE, REPRINTS, MOLECULAR VIBRATION

AD-A174 801

AD-A174 801

UNCLASSIFIED

PAGE 135

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 800 .12 5/0.12 7/0

AD-A174 598 .11 8/0

STATE UNIV OF NEW YORK AT STONY BROOK

NORTHWESTERN UNIV EVANSTON IL TECHNOLOGICAL INST

(U) The Design and Implementation of a Network Computer.

(U) Investigation and Synthesis of High Temperature and Increased Stiffness RSP Aluminum Alloys.

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

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

MAY 86 9P

PERSONAL AUTHORS: Bernstein, Arthur J. ;

OCT 86 12P

CONTRACT NO. AFOSR-81-0197

PERSONAL AUTHORS: Fine, Morris E. ; Weertman, Julia R. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-85-0337

TASK NO. A2

PROJECT NO. 2308

MONITOR: AFOSR
TR-86-0783

MONITOR: AFOSR
TR-86-1095

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The research performed under this grant is concerned with distributed languages and algorithms. The results obtained can be divided into 5 major areas: Distributed Languages - High level Consideration; distributed algorithms; network communication; support of multicast; and computer program verification.

ABSTRACT: (U) The objective of this research is to investigate two promising systems as the basis for high temperature aluminum alloys useful to 425 C (800 F). The first is a metal matrix composite consisting of an aluminum-magnesium alloy matrix reinforced by spinel (magnesium aluminate) particulate. The second system is tri-aluminum (zirconium, vanadium) dispersed in aluminum matrix. Here the lattice parameter matches that of the matrix. Research on dilute alloys has shown a low coarsening rate for this intermetallic at 425 C. Study of more concentrated alloys with the necessary volume percent of dispersoid for high temperature creep and fatigue resistance is underway. A procedure for preparing specimens of the aluminum alloy matrix-spinel composite has been worked out and specimens are being prepared. In the procedure rapidly solidified alloy powder and oxide are mechanically alloyed, cold pressed, hot pressed, pressure forged and annealed. Extrusions containing 5 volume percent tri-aluminum (0.75 vanadium, 0.25 zirconium) were prepared for this research by Lockheed-Palo Alto from rapidly solidified foil. The measured creep rate at 425 C is much lower than in the current aluminum-iron-cerium alloy.

DESCRIPTORS: (U) *HIGH LEVEL LANGUAGE, *DISTRIBUTED DATA PROCESSING, ALGORITHMS, COMPUTER PROGRAM VERIFICATION, NETWORKS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A2

DESCRIPTORS: (U) *STIFFNESS, *ALUMINUM ALLOYS, *HIGH

AD-A174 800

AD-A174 598

UNCLASSIFIED

PAGE 136 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 598 CONTINUED

TEMPERATURE, MAGNESIUM ALLOYS, ZIRCONIUM ALLOYS, VANADIUM ALLOYS, ALUMINATES, CERIUM, CONCENTRATION (COMPOSITION), CREEP, DILUTION, EXTRUSION, FATIGUE (MECHANICS), HEAT RESISTANT ALLOYS, IRON ALLOYS, MAGNESIUM COMPOUNDS, MATRIX MATERIALS, METAL MATRIX COMPOSITES, POWDER ALLOYS, RATES, RESISTANCE, SOLIDIFICATION, SPINEL, SYNTHESIS

AD-A174 585 .20 11/0

COMPUTATIONAL MECHANICS CD INC AUSTIN TX

- (U) Computational Methods for Nonlinear Dynamics Problems in Solid and Structural Mechanics: Models of Dynamic Frictional Phenomena in Metallic Structures.

DESCRIPTIVE NOTE: Final rept. 1 Feb 84-1 Feb 86.

MAR 86 343P

PERSONAL AUTHORS: Oden, J. T. ;

REPORT NO. TR-86-02

CONTRACT NO. F49620-84-C-0024

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2015

UNCLASSIFIED REPORT

ABSTRACT: (U) In this report the dynamic behavior of metallic bodies subjected to dry frictional contacts is studied. A simple model of interface response which incorporates a constitutive equation for the normal deformability of the interface and the Coulomb law of friction is developed. This interface model is incorporated in the formulation of problems in continuum mechanics that involve the contact of linearly elastic or viscoelastic bodies. Variational formulations for these problems are established and existence and uniqueness results are proved for steady-sliding and dynamic frictionless or frictional contact problems. The same interface model is also incorporated in finite dimensional models for contact problems: a simple rigid body model and finite element space discretizations of the continuum models. Numerical studies steady sliding and its dynamic stability are presented, as well as numerical studies of friction-induced oscillations. In the latter case, the Newmark method and the central-difference technique are used to integrate numerically the equations of motion. In the numerical studies particular emphasis is given to the role played by normal degree-of-freedom in frictional sliding.

AD-A174 598

AD-A174 585

UNCLASSIFIED

PAGE 137

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 585 CONTINUED

AD-A174 584 12 3/0

DESCRIPTORS: (U) *SLIDING FR'CTION, DRY MATERIALS,
NUMERICAL ANALYSIS, INTERFACES, STRUCTURAL MECHANICS,
DAMPING, CONTINUUM MECHANICS, RIGIDITY, FINITE ELEMENT
ANALYSIS, MATHEMATICAL MODELS, VIBRATION, OSCILLATION

IDENTIFIERS: (U) WUAFOSR2302B1, Pe81102F

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Adapting for Heteroscedasticity in Regression Models.
DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86.

JUL 86 33P

PERSONAL AUTHORS: Carroll, Raymond J. ; Ruppert, David ;
Stefanski, Leonard A. ;

REPORT NO. NIMED SER-1702

CONTRACT NO. F49620-85-C-0144, NSF-MCS81-00748

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2063

UNCLASSIFIED REPORT

ABSTRACT: (U) This document investigates the limiting behavior of a class of one-step M-estimators in heteroscedastic regression models. The mean function is assumed to be known up to parameters, but the variance function is considered an unknown function of a dimensional vector. The variance function is to be estimated nonparametrically by a function of the absolute residuals from the current fit to the mean. Under a variety of conditions when the estimates adapt for scale, i.e., the regression parameter is estimated just as well as if the scale function was known. Connections with the theory of optimal semiparametric estimation are made. (Author)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION ANALYSIS, ESTIMATES, NONPARAMETRIC STATISTICS, LEAST SQUARES METHOD, RESIDUALS

IDENTIFIERS: (U) Heteroscedasticity

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UNCLASSIFIED

PAGE 138 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 583 CONTINUED

KENTUCKY UNIV LEXINGTON DEPT OF CIVIL ENGINEERING

(U) Three-Dimensional Elasto-Plastic Analysis for Soils.

DESCRIPTIVE NOTE: Annual rept. 15 Aug 85-14 Aug 86.

SEP 86 153P

PERSONAL AUTHORS: Hardin, Bobby O. ; Blandford, George E. ;

CONTRACT NO. AFOSR-84-0195

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-86-1059

DIMENSIONAL, STRESSES, DIRECTIONAL, DYNAMIC LOADS, SOIL
DYNAMICS, SOILS, PARTICULATES, STRENGTH MECHANICS,
TRIAXIAL STRESSES, HARDENING, COMPRESSIVE PROPERTIES,
CLAY, MATHEMATICAL MODELS, COMPUTER PROGRAMS, ALGORITHMS

IDENTIFIERS: (U) Elastoplasticity, EPSAP computer
program, Cyclic loads, Constitutive equations, Plastic
hardening, Soil strength

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents the second year accomplishments perfecting the elasto-plastic constitutive equations of Hardin (1978) and their implementation into EPSAP (Elasto-Plastic Soil) Analysis Program). Essential features of soil behavior that result from the soil skeleton being particulate are included in the soil model. It is recognized that plastic behavior of particulate materials depends on direction of effective stress increment as well as state of effective stress. Two classes of stress increment directions are defined with different plastic potential and hardening functions for each class. Work has been directed toward: (1) modeling soil strength in terms of effective stress; (2) modeling work softening behavior for class 1 plastic hardening; (3) modeling class 2 plastic hardening; (4) modeling the class 1 plastic potential function for cyclic loading; (5) possible use of undrained triaxial compression test data for clays; (6) implementation into the finite element program of constitutive models; (7) introduction of two new elements into the analysis program, a modified eight node hexahedron finite element and an eight node infinite element; and (8) improvement of the nonlinear finite element solution strategy.

DESCRIPTORS: (U) *SOIL MODELS, *SOIL MECHANICS, STRESS ANALYSIS, ELASTIC PROPERTIES, PLASTIC PROPERTIES, NONLINEAR ANALYSIS, FINITE ELEMENT ANALYSIS, THREE

AD-A174 583

UNCLASSIFIED

PAGE 139

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

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AD-A174 579 .9 3/0.20 9/0

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL
ENGINEERING

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

(U) The Role of the Plasma during Laser-Gas Laser-Metal
Interactions.

DESCRIPTIVE NOTE: Interim rept. 1 Mar-28 Jun 86.

DESCRIPTIVE NOTE: Annual rept. 11 Feb 85-30 Sep 86.

OCT 86 18P

OCT 86 193P

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

PERSONAL AUTHORS: Rockstroh, Todd J.; Mazumder, Jyotiirmoy;

CONTRACT NO. AFOSR-82-0344

REPORT NO. UIIU-ENG-86-4011

PROJECT NO. 2305

CONTRACT NO. AFOSR-83-0041

TASK NO. C1

PROJECT NO. 2308

MONITOR: AFOSR
TR-86-2009

TASK NO. A1

MONITOR: AFOSR
TR-86-1052

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also report dated 28 Mar 86, AD-
A170 063.

ABSTRACT. (U) Graded regions of n-(Ga,In)As and p-Ga(As,
Sb) were incorporated side-by-side as emitter and base
contacts respectively, into an npn (Al,Ga)As/GaAs
heterostructure bipolar transistor (HBT). The process
involved two separate MBE growths, leading to base
contact regions that were self-aligned to the emitter
mesas. The devices could be easily probed with pressure
contacts even prior to any metallization, and excellent
characteristics were obtained after final metallization.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *ALUMINUM GALLIUM
ARSENIDE, *N TYPE SEMICONDUCTORS, *HETEROJUNCTIONS,
*BIPOLAR TRANSISTORS, *LOGIC CIRCUITS, EPITAXIAL GROWTH,
FABRICATION, MOLECULAR BEAMS, P TYPE SEMICONDUCTORS

IDENTIFIERS: (U) HBT(Heterostructure Bipolar Transistors)
Indium arsenides, Base contacts, Ohmic contacts,
Contacts(emitter), Metallization, PE61102F, WUAFOSR2305C1

AD A174 580

UNCLASSIFIED

AD-A174 579

PAGE 140 EVJ56L

ABSTRACT: (U) The regime of CW laser-plasma-target
interactions at intensities below 10 million W sq cm has
been overlooked except for a few studies of gas assist
configurations. The recent advances in industrial laser
material processing and modeling efforts warrant a
detailed study of laser-plasma-target interactions. The
10 KW CW CO2 laser facility has been used to study both
pure gas and metal gas plasmas. Spectroscopic diagnostics
have been applied to measure temperature in the plasma
core where local electron temperatures are in excess of
10,000 K.

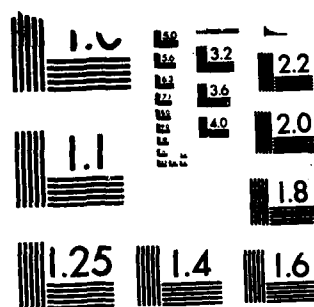
DESCRIPTORS: (U) *LASER TARGET INTERACTIONS,
*PLASMAS(PHYSICS), TRANSPORT PROPERTIES, METALS, LASER
BEAMS, CONTINUOUS WAVE LASERS, SPECTRUM ANALYSIS, TARGETS,
ALUMINUM, BREMSSTRAHLUNG, BREAKDOWN(ELECTRONIC THRESHOLD),
ION ENGINES, DIAGNOSIS(GENERAL), ARGON

IDENTIFIERS: (U) Laser produced plasmas, PE61102F,
WUAFOSR2308A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 575 .6 4/0.23 2/0

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Neuroelectric Predictors of Performance Accuracy.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-31 Mar 86.

JUL 86 24P

PERSONAL AUTHORS: Gavins, Alan S. ;

CONTRACT NO. AFOSR-85-Q381

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-86-0875

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Brain electrical patterns of seven right-handed adults were found to be different preceding accurate and inaccurate performance. Activity overlying the left frontal cortex and the motor and parietal cortices contralateral to the performing hand characterized subsequently accurate left- or right-hand performance. Additionally, strong activity overlying supplementary motor and premotor cortices preceded left-hand performance. Group patterns significantly distinguished subsequently accurate or inaccurate performance by individuals. These measurements suggest that brief, spatially distributed neural activity patterns, or 'preparatory sets', recorded from distinct cognitive, somesthetic-motor, and integrative motor areas of the human brain may be essential precursors of accurate visumotor performance. These precursors of performance accuracy were not present in even highly enhanced conventional averaged evoked potentials. Our findings suggest that important functional relations between areas of the human brain may be characterized by measuring the similarity of wave shape and timing between appropriately preprocessed low-frequency brain waves recorded from different channels at the scalp.

AD-A174 575 CONTINUED

DESCRIPTORS: (U) ELECTROENCEPHALOGRAPHY, COGNITION, NEUROPHYSIOLOGY, PERFORMANCE(HUMAN), ACCURACY, PRECURSORS, COVARIANCE, RESPONSE(BIOLOGY), VISUAL CORTEX, MOTOR REACTIONS, VISUAL PERCEPTION, CUES(STIMULI), HANDS, PERFORMANCE TESTS, ACCURACY, PREPROCESSING, PREPARATION, NEURAL NETS, HUMANS, ADULTS

IDENTIFIERS: (U) Handedness, Visumotor performance, Evoked potentials, Neuroelectric activity, Preparatory sets, WUAFOSR2313A4, PE61102F

AD-A174 575

AD-A174 575

UNCLASSIFIED

PAGE 141

EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 573 .12 3/0.13 8/0
FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS
(U) Distributions with Monotone Failure Rate.
86 12P
PERSONAL AUTHORS: Barlow, R. E.; Proschan, F. ;
CONTRACT NO. F49620-85-C-0007
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-86-2008

AD-A174 572 .9 5/0.20 6/1.20 12/0
HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER
(U) Thin-Film Optoelectronic Circuits Research Program.
DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 85-30 Jun 86.
JUL 86 45P
PERSONAL AUTHORS: Arnold, Steven M. ;
CONTRACT NO. F49620-85-C-0050
PROJECT NO. 2305
TASK NO. B1
MONITOR: AFOSR
TR-86-1094

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the International School of Physics, p12-22 1986.

ABSTRACT: (U) An interesting practical as well as theoretical question is the following: Under which reliability operations is the class of IFR DFR (Increasing (Decreasing) Failure Rate) distributions closed? For example, is the convolution of IFR distributions an IFR distribution? To answer this question we need to introduce some concepts from total positivity.
DESCRIPTORS: (U) *RELIABILITY, FAILURE, PROBABILITY DENSITY FUNCTIONS, FUNCTIONAL ANALYSIS, RATES, REPRINTS
IDENTIFIERS: (U) Monotone functions, WJAFOSR234A5, PE81102F

UNCLASSIFIED REPORT

ABSTRACT: (U) Monolithic integration of electronic circuits in silicon has made possible a revolution in electronic computation and signal processing. Today, gallium arsenide integrated circuits (GaAs ICs) are extending this electronic revolution to ever higher speed devices. Optical signal processing, despite its consistent advances and several early successes such as synthetic aperture radar and the optical spectrum analyzer, is falling increasingly behind the electronic competition. Functions which formerly required the speed and parallelism of optics are now being implemented entirely in digital electronics. The reasons for this are several, but one in particular stands out: the lack of emphasis given to compatibility issues between optical and electronic IC fabrication processes. As a result, most integrated optic devices demonstrated to date have been discrete components requiring laborious interfacing to predominantly electronic systems.

DESCRIPTORS: (U) *THIN FILMS, *ELECTROOPTICS, *WAVEGUIDES, *GALLIUM ARSENIDES, *SILICON, *INTEGRATED CIRCUITS, SYNTHETIC APERTURE RADAR, SIGNAL PROCESSING, COUPLING (INTERACTION), PHOTODETECTORS

IDENTIFIERS: (U) Optoelectronic Circuits, Vertical Confinement, Integrated Optics, Delta Beta Switches.

AD-A174 572

UNCLASSIFIED

PAGE 142 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 572 CONTINUED

Gallium Arsenides, Waveguides(Thin Film), Zinc Monoxide,
Channel Guides, Mach Zender Switches, WUAFOSR2305B1,
PE61102F

AD-A174 569 .12 1/0

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB
(U) Fractional Factorial Designs in the Form of Incomplete
Orthogonal Arrays.

DESCRIPTIVE NOTE: Interim rept..

JUL 86 18P

PERSONAL AUTHORS: Hedayat, A. S. ; Stufken, J. ;

REPORT NO. TR-86-08

CONTRACT NO. AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2058

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper we study certain fractional
factorial designs, which are known in the literature as
incomplete orthogonal arrays. We indicate situations in
which these designs can be of practical interest and
study both some of their mathematical, as well as
statistical properties.

DESCRIPTORS: (U) *FACTORIAL DESIGN, POLYNOMIALS,
MATHEMATICAL MODELS, ARRAYS, ORTHOGONALITY, SYMMETRY

IDENTIFIERS: (U) Incomplete Orthogonal Arrays,
WUAFOSR2304A5, PE61102F

AD-A174 572

AD-A174 569

UNCLASSIFIED

PAGE 143

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

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AD-A174 553 .11 6/1

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE

(U) A Note on Estimation with Quantized Data.

DEC 85 4P

PERSONAL AUTHORS: Liu, Yih-Chiao ; Wise, Gary L. ;

CONTRACT NO. AFOSR-81-0047, AFOSR-86-0026

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2056

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Acoustics, Speech, and Signal Processing. VASSP-33 n6
p1619-1621 Dec 85.

ABSTRACT: (U) Conditional expectations often arise in
estimation schemes. However, in many practical situations,
the estimation would be based upon quantized data. This
paper investigates the degradation in the estimation
caused by the quantization of the data. Some numerical
examples are given to illustrate the results.

DESCRIPTORS: (U) *ESTIMATES, *DATA REDUCTION,
*QUANTIZATION, RANDOM VARIABLES, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 561

UNCLASSIFIED

PAGE 144

EVJ56L

(U) Rapid Solidification Processing and Powder Metallurgy
of Al Alloys.

DESCRIPTIVE NOTE: Final technical rept. 15 Apr 82-15 Apr
86,

OCT 86 78P

PERSONAL AUTHORS: Fraser, Hamish L. ;

CONTRACT NO. AFOSR-82-0186

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-86-1099

UNCLASSIFIED REPORT

ABSTRACT: (U) Regarding work on the development of
microstructure during rapid solidification, three areas
have been addressed. The first of these involved a
determination of the mechanism of formation of the so-
called zones A and B in hyper-eutectic Al-transition
metal alloys. The second area of work involving the
development of microstructure concerns submerged phase
transformations. In a study of AL-Be hyper-eutectic
alloys, it was determined that solidification proceeded
by a set of phase transformations that may be described
by a monotectic reaction. The third area of study
concerning microstructural development involves quasi-
crystalline AL alloys. In fact, work done in this program
has concentrated on the potentially beneficial aspects of
quasi-crystalline phases in the microstructure of AL
alloys. Work on the consolidation of particulate has
concentrated on the use of conventional techniques (i.e.
extrusion) and novel processes (i.e. dynamic compaction).
An estimate of the mechanical properties of rapidly
solidified AL alloys has been obtained. As explained
above, the effect of extrusion is to cause decomposition
of the rapidly solidified microstructure. A comparison
has been made, using the alloy AL-8Fe-2Mo, between the
tensile properties of the decomposed microstructure (i.e.
extruded) and sub-scale test specimens produced by laser

AD-A174 553

UNCLASSIFIED

PAGE 144

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 553 CONTINUED

AD-A174 552 .20 10/0

surface melting, consisting entirely of zone A.

DESCRIPTORS: (U) *PONDER METALLURGY, *SOLIDIFICATION,
*ALUMINUM ALLOYS, MICROSTRUCTURE, EUTECTICS, PHASE
TRANSFORMATIONS, CRYSTALS, EXTRUSION, IRON, MOLYBDENUM,
TENSILE PROPERTIES

IDENTIFIERS: (U) PE81102F, WJAFOSR2308A1

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Hyperpolarizabilities of Hydrogen Fluoride Molecule: A
Discrepancy Between Theory and experiment?

MAR 86 9P

PERSONAL AUTHORS: Sekino, Hideo ; Bartlett, Rodney J. ;

CONTRACT NO. AFOSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0440

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v
64 ns p2728-2732, 1 Mar 86.

ABSTRACT: (U) Due to the recent availability of an
experimental value for the second- and third-order
electric polarizabilities of the HF molecule, possible
errors in the previous prediction of these quantities
have been considered. These include basis sets,
vibrational corrections, frequency dependence, infinite-
order correlation corrections, and the effect of triple
excitations. Despite the inclusion of all of these
effects, the discrepancy between experiment and theory
remains. Possible additional corrections are considered
with emphasis on basis set completeness. Considering the
difficulty in predicting such sensitive quantities, this
is rather good agreement. The paper also addresses
questions of reliability of ab initio calculations for
such high-order properties as hyperpolarizabilities,
while identifying some places where the experimental
results are susceptible to error.

DESCRIPTORS: (U) *HYDROGEN FLUORIDE, *POLARIZATION,
QUANTUM THEORY, EXPERIMENTAL DATA, OPTICAL PROPERTIES,
ERRORS, EXCITATION, MOLECULAR VIBRATION, CORRECTIONS,
HARTREE FOCK APPROXIMATION, REPRINTS

IDENTIFIERS: (U) PE81102F, WJAFOSR2301A4

AD-A174 553

AD-A174 552

UNCLASSIFIED

PAGE 145

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 548

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AD-A174 548 CONTINUED

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

(U) Fabrication of Material and Devices for Very High
Density Information Storage.

DESCRIPTIVE NOTE: Rept. no. 1 (Final) Jan-Dec 85.

NOV 86 15P

PERSONAL AUTHORS: Kryder, Mark H. ; Thuel, David ; Bowman,
Chris ; Huang, Ching-Hsing ;

CONTRACT NO. AFOSR-85-0100

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-86-1082

UNCLASSIFIED REPORT

ABSTRACT: (U) An ion beam deposition system was purchased and utilized for research on magnetic materials and devices for high density magnetic information storage. Initial work was carried out on the deposition of permalloy and the deposition of magnetic oxides. The work on permalloy revealed that ion beam deposited materials generally had smaller grain size and lower coercivity than R.F. sputtered materials. It was also found that the grain size and coercivity of ion beam deposited materials increased of a second ion gun were used to bombard the substrate during the deposition process. This work is being continued with support from other sources. The work on magnetic oxides was begun with the deposition of cobalt ferrite. X ray diffraction measurements indicate the material deposited was amorphous and exhibited a hard axis of anisotropy perpendicular to the plane of the film. This work is also being continued with support from other sources.

DESCRIPTORS: (U) *MAGNETIC ALLOYS, *MEMORY DEVICES,
*MAGNETIC FILM MEMORIES, ION BEAMS, DEPOSITION,
SPUTTERING, MAGNETOOPTICS, GRAIN SIZE, COBALT COMPOUNDS,
FERRITES, AMORPHOUS MATERIALS, X RAY DIFFRACTION, NICKEL
ALLOYS, IRON ALLOYS

AD-A174 548

AD-A174 548

UNCLASSIFIED

PAGE 148

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 545 .12 3/0

AD-A174 545 CONTINUED

NATIONAL RESEARCH COUNCIL WASHINGTON DC COMMISSION ON
PHYSICAL SCIENCES MATHEMATICS AND RESOURCES

IDENTIFIERS: (U) PEG1103F, WJAFOSR2304A1

(U) Renewing U.S. Mathematics; Critical Resource for the
Future.

DESCRIPTIVE NOTE: Final technical rept.,

APR 88 217P

PERSONAL AUTHORS: Kasper, Raphael ;

CONTRACT NO. AFOSR-83-0328

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-2083

UNCLASSIFIED REPORT

ABSTRACT: (U) In recent years, the group within the National Research Council that oversees our work in the physical sciences became concerned that the nation was not taking full advantage of the potential of the mathematical sciences. Accordingly, the council empaneled a group of outstanding scientists, many of whom, including the panel chairman, Edward David, represent scientific fields that use the results of mathematical research. The panel's task was to assess the adequacy of U.S. resources in support of mathematics. Renewing U.S. Mathematics is the product of that assessment. The panel discovered that recent funding increases in the computer sciences actually mask a downward trend in federal support for mathematics itself. The report lays out a bold remedial program that the panel believes is needed if we are to keep the mathematical sciences in the United States at the world forefront. We should not take for granted the broad practical payoff that derives from advances in pure and applied mathematics. I hope this report will play a part in helping the government, the public, and the scientific community itself to understand the risks we take if we neglect this crucial resource.

DESCRIPTORS: (U) *APPLIED MATHEMATICS, STATISTICS,
OPERATIONS RESEARCH, ENGINEERING, RESOURCE MANAGEMENT

AD-A174 545

AD-A174 545

UNCLASSIFIED

PAGE 147

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 844 .20 4/0

AD-A174 538 .12 3/0

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL
LABS

PRINCETON UNIV NJ DEPT OF ELECTRICAL ENGINEERING AND
COMPUTER SCIENCE

(U) Active Feedback Interaction with a Shear Layer.

(U) Dynamic Realizations of Sufficient Sequences,

DESCRIPTIVE NOTE: Annual progress rept. Jun 85-Jun 86.

SEP 85 8P

JUN 86 26P

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

PERSONAL AUTHORS: Dickinson, Bradley W. ; Sontag, Eduardo D.

CONTRACT NO. AFOSR-84-0120

CONTRACT NO. AFOSR-84-0381

PROJECT NO. 2307

PROJECT NO. 2304

TASK NO. A2

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-86-1034

TR-86-0820

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Work continues on the characterization of the effects of a pitching airfoil on the shear layer structure and growth under open loop forcing. We have shown that locally introduced disturbances can induce significant changes in the growth of the shear layer mixing zone. A separate investigation into the structure of the wake of an oscillating airfoil in a steady, uniform free stream revealed the existence of an axial flow along the cores of the wake vortices. The magnitude of the axial flow appears to depend on both the frequency and amplitude of oscillation.

DESCRIPTORS: (U) *AIRFOILS, *TURBULENT FLOW, *WAKE, SHEAR PROPERTIES, PITCH(MOTION), OSCILLATION, AIR FLOW, MIXING, VORTICES, FREE STREAM, AXIAL FLOW, UNSTEADY FLOW, CORES, FEEDBACK, INTERACTIONS, CONTROL, FREQUENCY, AMPLITUDE, LAYERS, TURBULENCE, OPEN LOOP SYSTEMS, FLOW VISUALIZATION

IDENTIFIERS: (U) Shear flow, Unsteady airfoils, Active control, Oscillating airfoils, WJAFOSR2307A2, PE81102F

AD-A174 544

UNCLASSIFIED

PAGE 148

EVJ58L

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, VIT-31 n5 p870-878 Sep 85. Prepared in cooperation with Rutgers Univ., Brunswick, NJ. Dept. of Mathematics, Contract AFOSR-80-0188.

ABSTRACT: (U) Let $(U_1, U_2, \dots)$ be a sequence of observed random variables and $(T_1, (U_1), T_2, (U_1, U_2), \dots)$ be a corresponding sequence of sufficient statistics (a sufficient sequence). Under certain regularity conditions, the sufficient sequence defines the input/output map of a time varying, discrete time nonlinear system. This system provides a recursive way of updating the sufficient statistic as new observations are made. Conditions are provided assuring that such a system evolves in a state space of minimal dimension. Several examples are provided to illustrate how this notion of dimensional minimality is related to other properties of sufficient sequences. The results can be used to verify the form of the minimum dimension (discrete time) nonlinear filter associated with the autoregressive parameter estimation problem.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, *SEQUENCES(MATHEMATICS), PROBABILITY DENSITY FUNCTIONS, RECURSIVE FUNCTIONS, INPUT OUTPUT PROCESSING, MAPPING(TRANSFORMATIONS), NONLINEAR SYSTEMS, DISCRETE DISTRIBUTION, ESTIMATES

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 538 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A174 537 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL

(U) Optimal Bandwidth Selection in Nonparametric
Regression Function Estimation.

85 16P

PERSONAL AUTHORS: Haerdle, Wolfgang ; Marron, James S. ;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2087

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Annals of Statistics, v13
n4 p1465-1481 1985.

ABSTRACT: (U) Kernel estimators of an unknown
multivariate regression function are investigated. A
bandwidth selection rule is considered, which can be
formulated in terms of cross validation. Under mild
assumptions on the kernel and the unknown regression
function, it is seen that this rule is asymptotically
optimal.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *REGRESSION
ANALYSIS, KERNEL FUNCTIONS, ASYMPTOTIC NORMALITY,
SELECTION, ESTIMATES, OPTIMIZATION, NONPARAMETRIC
STATISTICS, REPRINTS

AD-A174 538

AD-A174 537

UNCLASSIFIED

PAGE 149

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 534

.12 3/0

AD-A174 532 .11 8/1

ARIZONA UNIV TUCSON DEPT OF MATHEMATICS

(U) On the First Passage Times of Pure Jump Processes.

DESCRIPTIVE NOTE: Technical rept..

AUG 86 18P

PERSONAL AUTHORS: Shaked, Moshe ; Shanthikumar, J. G. ;

CONTRACT NO. AFDSR-84-0205

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFDSR
TR-86-2002

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with
California Univ., Berkeley, School of Business
Administration.

ABSTRACT: (U) Let T sub x be the time it for a pure jump
process, which starts at 0, to cross a threshold $x > 0$.
Sufficient conditions on the parameters of this process
under which T sub x has increasing failure rate average,
increasing failure rate or logconcave density are
identified.

DESCRIPTORS: (U) *PROBABILITY DENSITY FUNCTIONS, FAILURE,
POISSON DENSITY FUNCTIONS

IDENTIFIERS: (U) Jump Processes, Gamma Processes,
IFRA(Increasing Failure Rate Average). PEG1102F.
WUAFDSR2304K3

AD-A174 534

UNCLASSIFIED

PAGE 150

EVJ56L

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL
ENGINEERING AND MATERIALS SCIENCE

(U) Fundamental Studies of Beta Phase Decomposition Modes
in Titanium Alloys.

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

JAN 86 58P

PERSONAL AUTHORS: Aaronson, H. I. ; Dalley, A. M. ; Furuhara,
T. ; Lee, H. J. ; Nityanand, N. ;

CONTRACT NO. AFOSR-84-0303

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-2010

UNCLASSIFIED REPORT

ABSTRACT: (U) A TEM study of the interphase boundary
structure of proeutectoid alpha plates in a Ti-7.15% Cr
alloy has shown that both the broad faces and edges of
the plates are partially coherent. At the broad faces,
misfit dislocations are $1/3 < 1120 >$ whereas at the edges
they are $1/3 < 1123 >$. For normal alpha plates, the
dislocations are ca. 20nm apart at the broad faces and 8
nm apart at the edges. At black plates, the low
temperature morphological variant of proeutectoid alpha,
the dislocations are ca. 35nm apart. Growth ledges are
typically 100 - 350 nm apart at the broad faces of
normal plates and ca. 700 nm apart on black plates. A
detailed 0-lattice analysis has demonstrated that a
simple correlation between the misfit dislocation and the
growth ledge structures does not exist. Growth kinetics
studies of grain boundary allotriomorphs in Ti-3.9 w/o Co
and Ti-7.15 w/o Cr have shown for the first time that the
receptor plate mechanism is operative when the matrix
phase has a bcc crystal structure. As previously
predicted, however, this mechanism accelerates growth
substantially less at a given homologous temperature than
previous work has shown it to do in fcc matrices. The
feasibility of detailed fundamental studies of the

AD-A174 532

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 532 CONTINUED

Influence of beta grain size upon the development of Widmanstätten alpha sideplates has been demonstrated. Preliminary observations have been made on sideplate evolution from grain boundary allotriomorphs by both local morphological instability and sympathetic nucleation.

DESCRIPTORS: (U) *TITANIUM ALLOYS, *PHASE TRANSFORMATIONS, BAINITE, EUTECTICS, GRAIN BOUNDARIES, PLATES, CHROMIUM, DISLOCATIONS, CRYSTAL STRUCTURE, MORPHOLOGY, GROWTH(GENERAL), KINETICS, COBALT, GRAIN SIZE, STABILITY, NUCLEATION, PEARLITE

IDENTIFIERS: (U) PB81102F, WJAFOSR2306A1

AD-A174 530 .11 2/0.20 2/0.20 13/0
PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS
RESEARCH LAB

(U) Ultra-Low Thermal Expansion Ceramics.

DESCRIPTIVE NOTE: Final rept. Jul 83-Jun 86.

AUG 86 16P

PERSONAL AUTHORS: McKinstry, H. A.; Agrawal, D. K.; Lenain, G. E.; Vikram S. V.; Limaye, C. S.;

CONTRACT NO. AFOSR-83-0291

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-86-2080

UNCLASSIFIED REPORT

ABSTRACT: (U) The crystal chemistry, synthesis, and thermal expansion investigation of NZP-family was completed--in that M superscript12r2P3012 (M superscript1 = Li, Na, K, Rb, Cs), M superscript112r4P6024 = Mg, Ca, Sr, Ba) and a few more compositions were studied. Single crystals of (NZP) and (CZP) were grown, and high-temperature x-ray measurements were made on these crystals to test the validity of a structural model to interpret thermal expansion data. The possibility of the development of a glass-ceramic of NaGe2P3012 was explored. Dielectric measurements made on CaZr4P6024 reveal that in general (NZP)-materials have a low dielectric constant. Three new families, namely diborides (ZrB2, TiB2, and CrB2), Al2O3-GeO2 system and perovskite Pb(Mg1/3Nb2/3)O3 were investigated in order to search for any new low thermal expansion composition, but not much success was achieved in this direction, except that some perovskite compositions displayed low alpha behavior at low temperatures.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *THERMAL EXPANSION, CRYSTAL STRUCTURE, SYNTHESIS, ALKALI METAL COMPOUNDS, ALKALINE EARTH COMPOUNDS, ZIRCONIUM, PHOSPHORUS, OXYGEN, SINGLE CRYSTALS, CRYSTAL GROWTH, GERMANIUM COMPOUNDS, DIELECTRICS, MEASUREMENT, BORIDES, PEROVSKITES

AD-A174 530

AD-A174 532

UNCLASSIFIED

PAGE 151

EVJ56L

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

AD-A174 528 .12 3/0

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Sampling Plans Excluding Contiguous Units.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 18P

PERSONAL AUTHORS: Hedayat, A. S. ; Rao, C. R. ; Stufken, J. ;

REPORT NO. 86-13

CONTRACT NO. F49628-85-C-0008, AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2081

UNCLASSIFIED REPORT

ABSTRACT: (U) This document fixed size sampling plans for which the second order inclusion probabilities are zero for pairs of contiguous units and constant for pairs of noncontiguous units. A practical motivation for the use of such plans is pointed out and a statistical condition is identified under which these plans are more efficient than the corresponding simple random sampling plans. Results on the existence and construction of these plans are obtained.

DESCRIPTORS: (U) *STATISTICAL SAMPLES, ESTIMATES, CORRELATION TECHNIQUES, POPULATION, MATHEMATICAL MODELS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 528

UNCLASSIFIED

SEARCH CONTROL NO. EVJ56L

AD-A174 525 .12 9/0

NORTHEASTERN UNIV BOSTON MA

(U) Asynchronous Discrete Control of Continuous Processes.

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

FEB 86 199P

PERSONAL AUTHORS: Kaliski, Martin E. ;

CONTRACT NO. F49620-82-C-0080

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2052

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) This research concerns the analysis and synthesis of asynchronous systems that contain discrete-state feedback compensators for continuous state plants. New tools for characterizing both the interfaces and the signals present in these intrinsically hybrid systems were developed. Generalizations of automata theory to real number alphabets were pursued and the application of semigroup theory to the dynamics of such systems has allowed for novel approaches for characterizing the internal state of asynchronous systems to be derived. A simulator for these 'asynchronous machines' has been written and allows us to bridge the gap between ideal systems, on one hand, and systems with physically constrained processing times, on the other.

DESCRIPTORS: (U) *CODING, *ASYNCHRONOUS SYSTEMS, *CONTROL THEORY, *FEEDBACK, AUTOMATA, SWITCHING, COMPENSATION, HYBRID SYSTEMS, INTERFACES, CONTROL SYSTEMS, TIME SIGNALS, SIMULATORS, REAL TIME, MULTIPLE OPERATION, MATHEMATICAL ANALYSIS

IDENTIFIERS: (U) Automata theory, Discrete control, Switching theory, Continuous processes, Feedback control, Asynchronous coders, PE61102F, WUAFOSR2304A1

AD-A174 525

PAGE 152 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 524 .12 9/0.20 6/0 AD-A174 524 CONTINUED
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES
(U) Optical Signal Processing Using Non-Linear Optics.
DESCRIPTIVE NOTE: Annual rept. 1 Aug 84-30 Nov 85.
APR 86 10P
PERSONAL AUTHORS: Steier, William H. ;
CONTRACT NO. AFOSR-84-0207
PROJECT NO. 2305
TASK NO. B4
MONITOR: AFOSR TR-88-2011

IDENTIFIERS: (U) Optics(Nonlinear), Mixing(Four Wave),
Convolvers(Optical), Wave Mixing(Four), Waves(Pumping),
Beams(Read), Materials(Nonlinear), Carbon Disulfide,
Beams(Write), MUNAFOSR230584, PE61102F

POLARIZATION, ORTHOGONALITY, ARGON LASERS, OPTICAL
PUMPING, HELIUM NEON LASERS, LASER BEAMS, OPTICAL
MATERIALS, ACCURACY

UNCLASSIFIED REPORT

ABSTRACT: (U) The 2-D correlation/convolution which can be achieved in real time via four wave mixing in nonlinear materials has been investigated in detail to determine the accuracy and signal power investigated in detail to determine the accuracy and signal power possible. This analysis was initiated under other support; the experimental confirmation was completed under this contract. The analysis which is based on Fourier transforms of the equations of non-linear interaction has resulted in a closed form solution for the output and clearly shows how it differs from the desired 2-D correlation. In the example of a scene that is searched for given objects, the accuracy decreases as the ratio of scene to object size increases. The accuracy also resulting in a trade-off between accuracy, size of scanned scene, and power or signal to noise ratio in the output. The analysis was confirmed experimentally in a collinear four wave interaction in the photorefractive material bismuth silicon oxide at 5145 A. The accuracy of the correlation between relatively simple patterns was measured and agreed well with the prediction of the analysis.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL PROCESSING, *SIGNAL PROCESSING, *CONVOLUTION, *CORRELATORS, *PROCESSING EQUIPMENT, TWO DIMENSIONAL, FOURIER TRANSFORMATION, SCANNING, SIGNAL TO NOISE RATIO.

AD-A174 524

AD-A174 524

UNCLASSIFIED

PAGE 153

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 523 .12 3/0

AD-A174 521 .9 3/0.20 7/0.20 8/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

DARTMOUTH COLL HANOVER N H DEPT OF PHYSICS AND ASTRONOMY

(U) Confidence Bands under Proportional Hazards.

(U) High Power, Millimeter-Wavelength, Coherent Radiation Sources.

DESCRIPTIVE NOTE: Technical rept..

AUG 86 27P

DESCRIPTIVE NOTE: Final rept. 1 Feb 82-31 Jan 88.

PERSONAL AUTHORS: Hollander, Myles ; Pena, Edsel ;

SEP 86 72P

REPORT NO. FSU-STATISTICS-W743, TR-86-196-AFOSR

PERSONAL AUTHORS: Walsh, John E. ;

CONTRACT NO. F49620-85-C-0007

REPORT NO. 86-0188

PROJECT NO. 2304

CONTRACT NO. AFOSR-82-0188

TASK NO. A5

PROJECT NO. 2301

MONITOR: AFOSR
TR-86-2086

TASK NO. A8
MONITOR: AFOSR
TR-86-1089

UNCLASSIFIED REPORT

ABSTRACT: (U) Asymptotic simultaneous confidence bands are derived for the survival function under the proportional hazards model of random right-censorship. These bands are based on the maximum likelihood estimator of the survival function, rather than the well-known product limit estimator. In the case where the censoring parameter, denoted by β , is known the bands are asymptotically exact, while when β is unknown the bands are asymptotically conservative. For the case where β is unknown, the proposed bands are shown to be narrower than those proposed by Cheng and Chang (1985). Csorgo and Korvath's (1986) idea of mixing bands is then employed to obtain even narrower bands. As one would expect, under the more structured model, the PLE-based band of Gillespie and Fisher (1979) is shown to be inferior to the MLE-based bands, and this inferiority is more marked as the degree of censoring increases.

DESCRIPTORS: (U) *FUNCTIONS(MATHEMATICS), *MATHEMATICAL MODELS, SURVIVABILITY, ASYMPTOTIC NORMALITY, MAXIMUM LIKELIHOOD ESTIMATION, WEAK CONVERGENCE, STATISTICAL SAMPLES

IDENTIFIERS: (U) *Confidence bands, Kozlowski green model, WJAFOSR2304A5, Pe61102F

AD-A174 523

UNCLASSIFIED

PAGE 154 EVJ56L

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of the results of the Cerenkov maser development is presented. During the course of this work, operation over the spectral range extending from just below 30 GHz to just above 300 GHz was demonstrated. Sources based upon high-power microwave-tube technology and sources driven by pulse-power generators were both used to drive Cerenkov Masers. In the former type, 10% efficiency from single-pass, untapered resonators were obtained, while in the latter, efficiency was in the 0.1-1% range. Extensive computer codes describing linear and nonlinear aspects of Cerenkov Master operation were also developed.

DESCRIPTORS: (U) *MASERS, *CERENKOV RADIATION, *ELECTRON BEAMS, *COHERENT ELECTROMAGNETIC RADIATION, *SOURCES, *DILECTRIC AMPLIFIERS, FAR INFRARED RADIATION, MILLIMETER WAVES, NONLINEAR SYSTEMS, PULSE GENERATORS, FREE ELECTRONS, DISPERSION RELATIONS, MICROWAVE OSCILLATORS, RESONATORS, SUBMILLIMETER WAVES, GRATINGS(SPECTRA), GAIN, EFFICIENCY, HIGH POWER, THESESE

IDENTIFIERS: (U) Cerenkov masers, High power masers, Cylindrical waveguides, Untapered resonators, Mode locked

AD-A174 521

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 521 CONTINUED

plasmas, Lined waveguides, Plasma diagnostics, SLAB waveguides, Quasi optics, Beam diagnostics, Free electron masers, Rectangular waveguides, Open resonators, Van Der Pol theory, Relativistic beams, WUAFOSR2301A8, PE61102F

AD-A174 520 .20 4/0.21 2/0

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 85-29 Sep 86.

OCT 86 21P

PERSONAL AUTHORS: Toong, Tau-Yi ;

CONTRACT NO. AFOSR-83-0373

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2071

UNCLASSIFIED REPORT

ABSTRACT: (U) Simultaneous measurements of velocity (in a direction normal to the flame brush) and temperature in premixed, od-stabilized, lean methane/air V-flames demonstrated the presence of high-frequency fluctuations within slowly drifting flame brushes, thus indicating a structure different from that of a simple wrinkled-laminar flame. Both the velocity and the temperature fluctuations gave maximum RMS values at a position somewhere between the unreacted and the product gases. Furthermore, cross-correlation coefficients of these simultaneous signals assumed rather high values within the reaction zone, suggesting the possibility that these fluctuations might be induced by the same governing mechanism (which, according to the theory reported previously, was due to the coupling between chemical kinetics and turbulence). A paper on the genesis of transverse waves in gaseous detonations was published in Combustion and Flame. A manuscript on the thermal structure of turbulent flames was submitted for presentation at the Fall Technical Meeting of the Eastern Section of the Combustion Institute. Another manuscript on turbulence-combustion interactions was in preparation.

DESCRIPTORS: (U) *COMBUSTION, *FLAME PROPAGATION, *TURBULENCE, *SUBSONIC FLOW, *SUPERSONIC FLOW, CHEMICAL REACTIONS, METHANE, AIR, FUELS, FLAMES, BRUSHES, VELOCITY.

AD-A174 521

AD-A174 520

UNCLASSIFIED

PAGE 155

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 520 CONTINUED

TEMPERATURE, TRANSVERSE WAVES, DETONATIONS, REACTION
KINETICS, HIGH FREQUENCY

AD-A174 518 .11 2/0.20 2/0

HUGHES RESEARCH LABS MALIBU CA

IDENTIFIERS: (U) WJAFOSR2308A2, PEB1102F

(U) Optical Fibers for Nonlinear Optics.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-15 (Jul 86.

OCT 86 SOP

PERSONAL AUTHORS: Rand, S. C. ;

CONTRACT NO. F49620-84-C-0043

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-1096

UNCLASSIFIED REPORT

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

ABSTRACT: (U) The main objective of this contract has
been to find methods of fabricating single-crystal
nonlinear optical fibers. Successful techniques were to
be utilized to make crystal fibers useful for nonlinear
optical devices, particularly devices exploiting second
order optical nonlinearities. Device concepts and
applications were also to be formulated. This work was
initially divided into three parts. The first of these
emphasized materials purification, characterization, and
the measurement of physical and chemical properties of
materials used in the fabrication of single-crystal and
nonlinear fibers. The second task explored a variety of
methods of production of single-crystal (SC) fibers,
recognizing that one method can be applied, even in
principle, to SC fiber growth of all materials of
interest. The third task in this program involved the
measurement of optical properties of the fabricated
fibers and development of device applications.

DESCRIPTORS: (U) *SIMPLE CRYSTALS, *GLASS, *FIBER OPTICS,
*NONLINEAR SYSTEMS, REFRACTIVE INDEX, NONLINEAR GENERATORS,
LIQUIDS, AMMONIUM COMPOUNDS, PHOTOPTICS, FABRICATION

IDENTIFIERS: (U) Phase matching, resonant waves.

AD-A174 520

AD-A174 518

UNCLASSIFIED

PAGE 186 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L

AD-A174 518 CONTINUED

Nonlinear optics, DTA(Differential Thermal Analysis), Hybrid fibers, Three wave mixing, Ammonium dihydrogen phosphates, UAFOSR2301A1, PEG1102F

AD-A174 517 .12 3/0

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) On the Mean Squared Error of Nonparametric Quantile Estimators under Random Right-Censorship.

DESCRIPTIVE NOTE: Technical rept..

SEP 86 14P

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

REPORT NO. TR-122

CONTRACT NO. AFOSR-84-0186, NIPR-ARO-139-85

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2088

UNCLASSIFIED REPORT

ABSTRACT: (U) For randomly right-censored data, new asymptotic expressions for the mean squared errors of the product-limit quantile estimator and a kernel-type quantile estimator are presented in this paper. From these results a comparison of the two quantile estimators with respect to their mean squared errors is given. (Author)

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS. *PROBABILITY DISTRIBUTION FUNCTIONS. *ESTIMATES. ASYMPTOTIC NORMALITY. MEAN. ERRORS. KERNEL FUNCTIONS

AD-A174 518

AD-A174 517

UNCLASSIFIED

PAGE 157 EVJ86L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

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2/O

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Inference on the Occurrence/Exposure Rate and Simple Risk Rate.

(U) An Investigation of Flow Structure, Mixing and Chemical Reaction in Combusting Turbulent Flows.

DESCRIPTIVE NOTE: Technical rept.,

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

AUG 86

26P

OCT 86

11P

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

PERSONAL AUTHORS: Bowman, Craig T.; Cantwell, Brian J.;

REPORT NO. TR-86-18

CONTRACT NO. AFOSR-84-0373

PROJECT NO. 2304

PROJECT NO. 2308

TASK NO. A5

TASK NO. A2

MONITOR: AFOSR

MONITOR: AFOSR
TR-86-1033

TR-86-2057

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper, studies the asymptotic distributions of the functions of the occurrence/exposure rate. Asymptotic distributions of functions of the simple risk rates are also derived. The results are useful in not only medical research but also in the area of reliability.

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

ABSTRACT: (U) The principal objective of this experimental investigation of the relationship between flow structure and chemical reaction in turbulent reacting flows is to examine the spatial structure of the unsteady reaction process as it relates to the unsteady velocity field. The configuration studied is a coflowing, non-premixed jet flame. A small perturbation in the fuel jet velocity, produced acoustically, is used to create a very periodic and controllable flame, suitable for conditional sampling. Initial measurements of the unsteady velocity field in the flame have been obtained using laser anemometry. In addition, flow visualization experiments have been conducted using direct and schlieren photography and Mie scattering from seed particles introduced into the flow. Planar laser-induced fluorescence images of the OH radical, which provide spatially and temporally resolved information on the instantaneous location of the reaction zone, have been obtained. A particle tracking technique to facilitate acquisition of velocity field data is being developed.

DESCRIPTORS: (U) *TURBULENT FLOW, *COMBUSTION, *FLAMES.

AD-A174 516

AD-A174 515

UNCLASSIFIED

PAGE 158

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 515 CONTINUED

MIXING, CHEMICAL REACTIONS, REACTION KINETICS, MATHEMATICAL PREDICTION, VELOCITY, UNSTEADY FLOW, TIME DEPENDENCE, HYDROCARBONS, METHANE, AIR FLOW, STRUCTURAL PROPERTIES, HYDROXYL RADICALS, LASER ANEMOMETERS, FLOW VISUALIZATION

IDENTIFIERS: (U) Reacting Flows, Flow Structure, Jet Flows, WJAFOSR2308A2, PES1102F

AD-A174 512

MISSOURI UNIV-ST LOUIS DEPT OF PHYSICS

(U) Fundamental Quantum 1/F Noise in Ultrasmall Semi Conductor Devices and Their Optimal Design Principles.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 May 85-31 Apr 86, MAY 86 40P

PERSONAL AUTHORS: Handel, Peter H. ;

CONTRACT NO. AFOSR-85-0130

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-86-2012

UNCLASSIFIED REPORT

ABSTRACT: (U) A second-quantized derivation of the quantum (1/f) effect was developed. This derivation is based on the pair correlation function and automatically includes the right form of exchange between fermions and between bosons. Also for the first time a direct calculation of the effect of a finite mean free path was performed. This calculation justifies the calculation of quantum (1/f) noise and results in a correction factor of the order of the unity. As a first step of a more general study of (1/f) in semiconductor devices (n-p) diodes have been investigated with emphasis on (HgCdTe) photodetectors. Quantum (1/f) noise has been calculated in the surface and bulk recombination currents, in the diffusion and field currents, and in the tunneling currents. Due to the large localized electric field at the surface, a larger fractional quantum (1/f) noise power is obtained for surface recombination currents than for similar bulk recombination currents. All quantum (1/f) noise calculations are first principles calculations with no free parameters, based on the quantum (1/f) effect in scattering and recombination cross sections, as well as in tunneling rates.

DESCRIPTORS: (U) *QUANTUM ELECTRONICS, *SEMICONDUCTORS, *NOISE(ELECTRICAL AND ELECTROMAGNETIC), EXCHANGE REACTIONS, FERMIONS, BOSONS, PHOTODETECTORS, CADMIUM

AD-A174 515

AD-A174 512

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 512 CONTINUED

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TELLURIDES, MERCURY COMPOUNDS, TUNNELING(ELECTRONICS),
RECOMBINATION REACTIONS, TRANSPORT PROPERTIES

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

IDENTIFIERS: (U) Quantum Noise, Mean Free Path, Quantum
1/f Noise, WUAFOSR2305C1, PE81102F

(U) On the Theory of Conditioning in Point Processes.

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

SEP 86 11P

PERSONAL AUTHORS: Kallenberg, Olav ;

REPORT NO. TR-152

CONTRACT NO. F40620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2084

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper, written for the Proceedings of the First World Congress of the Bernoulli Society of Mathematical Statistics and Probability in Tashkent, 1988, summarizes the most fundamental concepts and relationships in the theory of conditioning in point processes. Though most results are taken from the author's book on Random Measures or from an earlier survey paper, the present emphasis is somewhat different, and there are even a couple of new results, mentioned here without proof. By a point process we mean a random configuration of isolated points in some topological space. Point processes arise naturally in a great variety of contexts, both theoretical and applied.

DESCRIPTORS: (U) *POINTS(MATHEMATICS), STOCHASTIC PROCESSES, PROBABILITY DISTRIBUTION FUNCTIONS, CONFIGURATIONS, TOPOLOGY, KERNEL FUNCTIONS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

AD-A174 512

AD-A174 500

UNCLASSIFIED

PAGE 160 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

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CINCINNATI UNIV ON DEPT OF AEROSPACE ENGINEERING AND
APPLIED MECHANICS

AD-A174 497 CONTINUED

experimental results and have now become benchmark
solutions for these problems.

(U) Analysis of Three-Dimensional Viscous Internal Flows.

DESCRIPTIVE NOTE: Final rept. 1 Mar 80-28 Feb 85.

DEC 85

57P

DESCRIPTORS: (U) *TURBOMACHINERY, *VISCOUS FLOW,
*INTERNAL FRICTION, NAVIER STOKES EQUATIONS, TURBULENT
FLOW, LAMINAR FLOW, INCOMPRESSIBLE FLOW, FLOW SEPARATION,
SECONDARY FLOW, UNSTEADY FLOW, TURBULENCE, CHANNEL FLOW,
DUCTS

PERSONAL AUTHORS: Chia, Kirti N.; Chia, Umalla ;

IDENTIFIERS: (U) Neumann problem, Parabolic differential
equations, BGEC(Block Gaussian Elimination), Backstep
channels, PE81102F, WUAFOSR2307A4

REPORT NO. AFL-88-12-70

CONTRACT NO. AFOSR-80-0160

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-88-2058

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this study was to acquire
improved understanding of viscous internal flows related
to turbomachinery components by analyzing appropriate model
flow problems. Significant effort was directed towards
developing basic computational methods which were made
available to interested researchers involved in
computational fluid dynamics (CFD) research and to users
involved in the design of turbomachinery components.
Several analyses were developed and include an asymptotic
analysis for the fully developed three-dimensional flow
in curved ducts, a parabolized Navier-Stokes analysis
for developing flow in curved ducts, an unsteady Navier-
Stokes analysis for internal and external flows,
adaptive grid generation for one and two dimensional
viscous flows, analysis of the Neumann problem in
generalized orthogonal coordinates, efficient semi-
implicit solution techniques consisting of the
alternating direction implicit multi grid and strongly
implicit multi grid methods, the direct block Gaussian
elimination(BGE) method for solution of the Poisson
equation for the unsteady Navier Stokes analysis of
incompressible flows. For the flow inside a shear driven
cavity, the asymptotic flow in curved ducts and clarity
for interpretation of the available corresponding

AD-A174 497

AD-A174 497

UNCLASSIFIED

PAGE 161

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 493 CONTINUED

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CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL
ENGINEERING

CRACK PROPAGATION, TOUGHNESS, FINITE ELEMENT ANALYSIS,
MATHEMATICAL PREDICTION

(U) Fundamental Studies in Fatigue and Fracture Mechanics.
Phase 1.

IDENTIFIERS: (U) *Stress intensity factor, Reissner
theory, LEFM(Linear Elastic Fracture Mechanics), PE61102F,
WJAFOSR2302B2

DESCRIPTIVE NOTE: Final rept. 15 Jan 85-14 Apr 86 on
Phase 1.

OCT 86 88P

PERSONAL AUTHORS: Sinclair, G. B. ;

REPORT NO. SM-86-13

CONTRACT NO. AFOSR-85-0030

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-86-1077

UNCLASSIFIED REPORT

ABSTRACT: (U) The basic tenet of fracture mechanics is that the stress intensity factor, K , controls fracture and fatigue; here the former claim is critically examined. The underlying supporting argument - the original energy argument of Griffith and the more modern K -controlled region view - are considered. These considerations demonstrate that there are questionable assumptions in both, so that the viability of K as a damage parameter for fracture has to be established by the physical evidence. The first question then is whether or not the critical value of K , $K_{sub Ic}$, is a material parameter: checking data shows it need not be. The second question is can the technology be usefully predictive, even in the most simple of situations: checking the data shows it to be unreliable in this role. At this time then, it remains to ask similar questions concerning the role of K in fatigue crack growth and, certainly for the monotonic loading case, develop alternatives: these are the objectives of the second phase of the program.

DESCRIPTORS: (U) *FRACTURE(MECHANICS),
*FATIGUE(MECHANICS), STRESS ANALYSIS, CRACKING(FRACTURING)

AD-A174 493

AD-A174 493

UNCLASSIFIED

PAGE 162

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L

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GTE LABS INC WALTHAM MA

(U) High Speed Low Power Nonlinear Optical Signal Processing.

DESCRIPTIVE NOTE: Final technical rept. 26 May 84-26 Jul 86.

SEP 86 107P

PERSONAL AUTHORS: Degenais, Mario ; Sharfin, Wayne F. ;

CONTRACT NO. F490820-84-C-0052

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-1053

generation of efficient optical modulators is envisioned.
(Author)

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL PROCESSING, *MIXING, *EXCITONS, *CADMIUM SULFIDES, *STARK EFFECT, *OPTICAL SWITCHING, *SEMICONDUCTORS, BAND THEORY OF SOLIDS, KINETIC ENERGY, PHOTONS, MASS, LINEAR SYSTEMS, CRYOGENICS, COUPLING(INTERACTION), SIGNAL PROCESSING, RESONANCE, FABRY PEROT INTERFEROMETERS, PLATES, POLARIZATION

IDENTIFIERS: (U) Bound excitons, Quantum dots, Confined stark effect, Quantum wires, Optical bistability, Free excitons, Broadening(Collision), Degeneracies, Polaritons, Four Wave Mixing, Nonlinear optics, Intrinsic spectrum, Valence bands, Conduction bands, Hexagonal crystals, PE81102F, WUAFOSR230584

UNCLASSIFIED REPORT

ABSTRACT: (U) During the two-year period of this contract, substantial progress was made in the understanding of both the linear and the nonlinear optical properties of direct gap semiconductors and in the implications for high speed, low power, nonlinear optical signal processing. In particular, the detuning and the temperature dependence of the damping of an exciton-polariton was obtained for the first time. The lowest single beam switching energy ($< 4 \text{ pJ}$) and the fastest reported ON/OFF switching ($< 1 \text{ ns}$) bistable device with clearly resolved stable states was demonstrated using the nonlinearity associated with bound excitons in CdS. Thermal effects on the millisecond and microsecond time scales were experimentally studied. Optical bistability due to induced absorption near the free and bound exciton was experimentally studied with and without a Fabry-Perot cavity. Large degenerate four-wave mixing signals were observed near free and bound excitons in CdS at cryogenic temperatures. Nonlinear transmission signals were studied at different detunings below the free exciton resonance and at temperatures up to 120 K. These signals were interpreted in terms of a broadening of the free exciton resonance by exciton-exciton collisions. The quantum confined stark shifting of a quantum dot was performed for the first time. A new

AD-A174 492

AD-A174 492

UNCLASSIFIED

PAGE 163

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

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 FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY
 AD-A174 479 .7 4/0.21 2/0.21 9/0
 RENNELAER POLYTECHNIC INST TROY NJ DEPT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

(U) Mathematical Techniques for System Realization and Identification.
 (U) Combustion Kinetics of Metal Oxide and Halide Radicals and Metal Atoms.

DESCRIPTIVE NOTE: Final rept. 1 Jun 81-31 Mar 85.

FEB 86 11P

PERSONAL AUTHORS: Kalman, R. E. ;

CONTRACT NO. AFOSR-81-0238

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
 TR-86-0858

UNCLASSIFIED REPORT

ABSTRACT: (U) Since its establishment in 1972, research at the Center for Mathematical System Theory has generated over 100 published papers. At the same time, the Center has served as a focal point for a considerable part of the system-theoretic research in the U.S. and elsewhere, through an active visitor program and through recruitment of outstanding doctoral students. This is especially true for the development and application of advanced algebraic and algebraic-geometric techniques in the system-theoretic context. The Center is an interdisciplinary, interdepartmental group, a basic function of which is to provide coordination and collaboration between advanced mathematics and engineering.

DESCRIPTORS: (U) *APPLIED MATHEMATICS. *AIR FORCE RESEARCH. BIBLIOGRAPHIES. ENGINEERING. THEORY. RESEARCH MANAGEMENT

AD-A174 487

UNCLASSIFIED

PAGE 184 EVJ58L

DESCRIPTIVE NOTE: Final rept. 1 Dec 81-30 Nov 85.

JAN 86 14P

PERSONAL AUTHORS: Fontijn, Arthur ;

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
 TR-88-0855

UNCLASSIFIED REPORT

ABSTRACT: (U) To help provide a better understanding of the temperature dependence of the kinetics of diatomic metal radical oxidation reactions, experimental measurements were made in the 450 to 1750 K temperature regime. An HTFR (high-temperature fast-flow reactor) was used. The metal radical concentrations were measured by laser-induced fluorescence. The general uses of this spectroscopic technique for rate measurements on reactants and products, as well as for product species identification and product state determination, are reviewed. The radicals studied in the HTFR on this grant are AlO , AlCl and BCl . Production methods for these are discussed. For the reaction $\text{AlO} + \text{CO}$ yields $\text{AlO}_2 + \text{AlO} + \text{CO}$ we obtain $k(T) = 2.5 \times 10^{-10}$ to the minus 14th power $\exp(400/T)$ cc/molecules/s. This negative activation energy implies $D(\text{O-AlO}) > D(\text{O-CO}) = 530$ kJ/mol, which is in apparent disagreement with the OAlO dissociation energy obtained for AlO_2 from Al_2O_3 evaporation-mass spectrometry studies. It is argued that the latter AlO_2 may have a different structure from that of the present work. For the reaction between AlCl and O_2 we find $k(T) = 8.8 \times 10^{-10}$ to the minus 13th power $\exp(-2990/T) + 1.5 \times 10^{-10}$ to the minus 10th power $\exp(-10800/T)$ cc/mol/s, which is compatible with a mechanism where the $\text{AlO}_2 + \text{Cl}$ product channel dominates at lower temperatures, while the $\text{OAlCl} + \text{O}$ channel dominates at higher temperatures. The $\ln k(T)$ versus dependence of the $\text{AlCl}/$

AD-A174 479

UNCLASSIFIED

PAGE 184 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 479 CONTINUED

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O2 reaction is contrasted to those observed for A10/O2 and BF/O2 reactions.

DESCRIPTORS: (U) *HALIDES, *MONOXIDES, *OXIDATION, *COMBUSTION, *METAL COMPOUNDS, REACTION KINETICS, CHEMICAL RADICALS, CONCENTRATION(CHEMISTRY), ROCKET RAMJETS, LASER INDUCED FLUORESCENCE, SPECTROMETRY, HIGH TEMPERATURE, COMBUSTION PRODUCTS, ALUMINUM OXIDES, ALUMINUM COMPOUNDS, CHLORIDES, BORON COMPOUNDS, ACTIVATION ENERGY, CHEMICAL DISSOCIATION, RECOMBINATION REACTIONS, SLURRIES, ROCKET PROPELLANTS

IDENTIFIERS: (U) Metal halides, Metal oxides, Temperature dependence, Metal radicals, Aluminum chlorides, Boron chlorides, Metallized propellants, Monohalide radicals, Combustion kinetics, PE8102F, WJAFOSR2308A1

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

(U) Optical Data Processing.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-30 Sep 85,

OCT 85 139P

PERSONAL AUTHORS: Casasent, David ;

CONTRACT NO. AFOSR-84-0293

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR
TR-88-1000

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on optical data processing for missile guidance and robotics is described. Our major emphasis is pattern recognition using feature extraction (Fourier coefficients, moments and chord features) and correlation (using distortion-invariant synthetic discriminant function matched spatial filters). All research in pattern recognition concerns multi-class distortion-invariant pattern recognition. Recent research includes: different feature extraction post-processors, new algorithms to extract distortion parameters from chord features and a hierarchical moment feature processor for distortion parameter estimation. Extensive database tests of moments and synthetic discriminant functions have been performed. Component research has addressed AO cells with performance measures and detector effects described. Matrix-vector research includes: error source analysis, a new quadratic matrix algorithm, and initial laboratory system results with attention to the electronic support system and the laboratory system fabrication. (Author)

DESCRIPTORS: (U) *OPTICAL PROCESSING, *PROCESSING EQUIPMENT, *PATTERN RECOGNITION, *HOLOGRAPHY, DATA PROCESSING EQUIPMENT, CORRELATORS, GUIDANCE, MOMENTS, MATCHED FILTERS, ERRORS, ALGORITHMS

AD-A174 479

AD-A174 465

UNCLASSIFIED

PAGE 165

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ58L

AD-A174 485 CONTINUED

AD-A174 484 .7 4/O.9 3/O

IDENTIFIERS: (U) Acoustooptics, Synthetic discriminants, Chords, Extraction(Feature), Discriminant functions, Coefficients(Fourier), Optical algebra, Post processors, Linear algebras, Optical recognition, Distortion estimation, Robotics, WUAFDSR230581, PE61102F

IAC NO. GC-870171

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)Data processing, Optical processors, Pattern recognition, Holography, Correlators, Errors, Algorithms, Acoustooptics, Guidance, Matched filters, Extraction, Coefficients, Linear algebraic equations, Distortion.;

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY
(U) Theory of Laser-Induced Phenomena on Conventional and Phase-Conjugated Surfaces.

NOV 86 37P

PERSONAL AUTHORS: Lin, J. T. ;Huang, Xi-Yi ;George, Thomas F.

REPORT NO. UBUFFALO/DC/86/TR-18

CONTRACT NO. N00014-86-K-0043, F49620-86-C-0009

MONITOR: AFOSR
TR-87-0335

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser induced processes on conventional and phase conjugated surfaces are investigated theoretically. Resonance fluorescence of two level atoms on smooth and rough surfaces are reviewed. The new phenomenon of a radiative dipole at a phase conjugated surface (PCS) is examined, where the lifetime of the dipole is virtually infinite under certain conditions. PCS originates from the interference of two laser beams incident on an absorbing layer and is discussed in terms of a phenomenological model and a hydrodynamic theory, where laser-induced periodic structure and the PCS reflectivity are analyzed. Finally, practical applications of these new phenomena occurring on PCS are discussed.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *LASER PUMPING, *SURFACE CHEMISTRY, RESONANCE RADIATION, DIPOLE MOMENTS, REFLECTANCE, SURFACE ROUGHNESS, REFLECTIVITY, ADATOMS, STARK EFFECT

IDENTIFIERS: (U) Phase conjugation, PCS(Phase Conjugated Surfaces), Four wave mixing

AD-A174 485

AD-A174 484

UNCLASSIFIED

PAGE 186 EVJ58L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 483 CONTINUED

AD-A174 483 .8 11/O.19 9/O
NEW MEXICO ENGINEERING RESEARCH INST ALBUQUERQUE

Analysis, Feature Extraction, Frequency Domain,
WUNAFOSR2307C1, PE61102F

(U) An Application of Signal Analysis and Pattern
Recognition to Study a Simple Ground Motion Problem.

DESCRIPTIVE NOTE: Final rept. Feb 82-Jul 85.

AUG 86 82P

PERSONAL AUTHORS: Carson, James M. ;

REPORT NO. NMRI-20

CONTRACT NO. AFOSR-82-0102

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-86-1078

UNCLASSIFIED REPORT

ABSTRACT: (U) A simple problem involving the identification of an explosive source as being unburied or buried using a pattern recognition based analysis of buried ground accelerometer measurements is presented. This problem illustrates the advantages of computerized information extraction from the measured waveforms. Information was extracted from the frequency and cepstrum descriptions of the waveforms in addition to the more traditional time domain information. These signal features were incorporated into a Fisher's Linear Discriminant pattern recognition procedure. Previously unseen signals were classified with up to 100% accuracy depending on which features were used. Close in explosive source measurements present unique problems to a pattern recognition based analysis approach. These problems are reviewed and approaches illustrated.

DESCRIPTORS: (U) *SEISMIC WAVES, *PATTERN RECOGNITION, *GROUND MOTION, ACCELEROMETERS, EXPLOSION EFFECTS, SEISMIC DATA, SIGNAL PROCESSING, WAVE ANALYZERS, TIME DOMAIN, FREQUENCY, CEPSTRUM TECHNIQUE, DISCRIMINATE ANALYSIS, EXTRACTION, CLASSIFICATION, BLAST LOADS

IDENTIFIERS: (U) Fishers Linear Discriminant, Signal

AD-A174 483

AD-A174 483

UNCLASSIFIED

PAGE 187

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A174 461 .11 1/O. 21 5/O

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE AND
PLASMA DYNAMICS LAB(U) Fluid Dynamic - Structural Interactions of Labyrinth
Seals.

DESCRIPTIVE NOTE: Final rept. 1 Dec 82-30 Nov 83.

JUN 86 33P

PERSONAL AUTHORS: Martinez-Sanchez, Manuel ; Dugundji, John ;

CONTRACT NO. AFOSR-83-0034

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2004

UNCLASSIFIED REPORT

ABSTRACT: (U) AIn analytical model was formulated for the calculation of unsymmetrical pressure distributions inside the cavities of a multi-stage labyrinth seal. The model is based on a set of linearized continuity and momentum equations for the throughflow, and can account for the effects of rotation, whirl, flow swirl, differential gap width and (limited) compressibility. Preliminary calculations show excellent agreement with non-whirling side-force data in the literature. Also, models are being constructed that will permit calculation of the effect of these seal forces on the running stability of flexible, highly loaded turbomachines, with the Space Shuttle Main Engine serving as the prototype of such machines.

DESCRIPTORS: (U) *ROTARY SEALS, *GAS TURBINES, SPACECRAFT COMPONENTS, PRESSURE SEALS, BEARINGS, TURBOPUMPS, SPACE SHUTTLES, STIFFNESS, DAMPING

IDENTIFIERS: (U) *Labyrinth seals, Pade approximations, WJAFOSR230281, PE61102F

AD-A174 461

UNCLASSIFIED

PAGE 188

EVJ56L

SEARCH CONTROL NO. EVJ56L

AD-A174 460 .14 2/O. 17 1/O

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) The Air Force Office of Scientific Research for Low-Frequency Acoustic Microscope.

DESCRIPTIVE NOTE: Final rept.,

MAY 88 4P

PERSONAL AUTHORS: Khuri-Yakub, B. T. ;

REPORT NO. GL-4051

CONTRACT NO. AFOSR-84-0198

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-86-1080

UNCLASSIFIED REPORT

ABSTRACT: (U) Low-frequency acoustic microscopy has demonstrated a tremendous potential for the nondestructive evaluation of metals, composite materials, and structural ceramics. This proposal allowed us to build a new, improved instrument with which can make not only amplitude, but also phase, measurements. The addition of the phase measurement capability allows us to do two dimensional image processing to extract more information from our measurements than is presently done with amplitude only acoustic microscopes. Also, the addition of the phase measurement capability allows us to measure profiles of samples with great accuracies.

DESCRIPTORS: (U) *ACOUSTIC MICROSCOPES, *PHASE STUDIES, TWO DIMENSIONAL, NONDESTRUCTIVE TESTING, LOW FREQUENCIES, SURFACE PROPERTIES, METALS, COMPOSITE MATERIALS, CERAMIC MATERIALS, SINTERING

IDENTIFIERS: (U) WJAFOSR2917A3, PE61102F

IAC NO. NT-035581

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

AD-A174 460

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 460 CONTINUED

IAC SUBJECT TERMS: N--(U)ACOUSTIC MICROSCOPY, LOW
FREQUENCY, INSTRUMENTATION, DETECTION, FOCUSING, FOCUSED
TRANSDUCERS, STRUCTURAL MATERIALS, PHASE, MEASUREMENT,
IMAGE PROCESSING, DEVELOPMENT;

AD-A174 453 .12 3/0

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

(U) Adaptive Control of Discounted Markov Decision Chains.

DESCRIPTIVE NOTE: Technical Note.

JUN 85 10P

PERSONAL AUTHORS: Hernandez-Lerma.O.; Marcus, S. I.;

CONTRACT NO. F49620-77-C-0101, AFOSR-78-0025

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-0619

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Optimization Theory
and Applications, v6 n2 p227-235 Jun 85.

ABSTRACT: (U) This paper considers discounted reward
finite state Markov decision processes which depend on
unknown parameters. An adaptive policy inspired by the
nonstationary value iteration scheme of Federgruen and
Schwartz is proposed. This policy is briefly compared
with the principle of estimation and control recently
obtained by Schal.

DESCRIPTORS: (U) *DECISION THEORY, *MARKOV PROCESSES,
ADAPTIVE CONTROL SYSTEMS, ITERATIONS, PARAMETERS,
ESTIMATES, FEEDBACK, STOCHASTIC CONTROL, REPRINTS

IDENTIFIERS: (U) Markov chains, Nonstationary, Value
Iterations, PE81102F, WUAFOSR2304A1

AD-A174 460

AD-A174 453

UNCLASSIFIED

PAGE 189

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ56L

AD-A174 451 .8 7/0.13 3/0.20 11/0

AD-A174 450 .12 5/0

ARIZONA UNIV TUCSON DEPT OF CIVIL ENGINEERING

IOWA UNIV IOWA CITY OPTIMAL DESIGN LAB

(U) Constitutive Modelling of Concrete and Rocks Under Multiaxial Compressive Loadings.

(U) Computer-Aided Structural Design Optimization Using a Database Management System.

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

DESCRIPTIVE NOTE: Interim technical rept. Oct 84-Sep 85.

SEP 86 438P

SEP 86 320P

PERSONAL AUTHORS: Salami, M. R.; Desai, C. S. ;

PERSONAL AUTHORS: SreekantaMurthy, T.; Arora, Jasbir S. ;

CONTRACT NO. AFOSR-83-0256

REPORT NO. ODL-85-17

PROJECT NO. 2302

CONTRACT NO. AFOSR-82-0322

TASK NO. C1

PROJECT NO. 2307

MONITOR: AFOSR
TR-86-2014MONITOR: AFOSR
TR-86-2089

UNCLASSIFIED REPORT

ABSTRACT: (U) This research envisages development of constitutive models for joints in rock (concrete) subjected to cyclic loads. The objective is to implement the models in (numerical) solutions of boundary value problems involving solids and joints subjected to dynamic loads such as blasts and earthquake. Hence, it is appropriate to develop models for both the joints and the intact or solid (concrete) media in which the joints occurs. This report contains description of a new hierarchical plasticity-based constitutive model, laboratory testing using a multiaxial device and verification for the intact concrete used in the investigation.

DESCRIPTORS: (U) *ROCK MECHANICS, *JOINTS, *CONCRETE, BOUNDARY VALUE PROBLEMS, MATHEMATICAL MODELS, PLASTIC DEFORMATION, ELASTIC PROPERTIES, HIERARCHIES, LABORATORY TESTS, CYCLIC TESTS, LOADS(FORCES), TRIAXIAL STRESSES, STRESS STRAIN RELATIONS, COMPRESSIVE PROPERTIES, TENSILE STRENGTH, FAILURE(MECHANICS), THESES

IDENTIFIERS: (U) Constitutive models, Cyclic loading, Soapstone, Geologic materials, Multiaxial loading, PE61102F, WUAFOSR2302C1

AD-A174 451

UNCLASSIFIED

PAGE 170 EVJ56L

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.

ABSTRACT: (U) A study was made to integrate finite element-based-optimal structural design methods and computer-science methods into a computer-based system containing a database, a program library and machine communication link. Emphasis is placed upon database management concepts for structural design. Important components required to build a computer-aided structural design system are described. A number of database management concepts -- hierarchical, network and relational data models, conceptual, internal and external view of data organization, normalization of data, and global and local database are discussed with reference to structural design data. A methodology to design a database is proposed. Three levels of data organization-conceptual, internal and external are suggested. A methodology to construct a numerical data model is described. This model supports data of various types of large matrices such as banded, skyline and hypermatrices. Requirements of database management system and components needed to develop it are discussed. Language requirements to enable good communication link between designer and computer are formulated. A database

AD-A174 450

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 450 CONTINUED

management system - MIDAS is implemented for use in structural design applications.

DESCRIPTORS: (U) *COMPUTER AIDED DESIGN, *SYSTEMS ENGINEERING, *DATA BASES, FINITE ELEMENT ANALYSIS, INTEGRATED SYSTEMS, OPTIMIZATION, STRUCTURAL ENGINEERING, COMPUTER PROGRAMS, FORTRAN, THESES

IDENTIFIERS: (U) Data base management systems, MIDAS(Management of Information for Design and Analysis of Systems), PEG102F, MJAFOSR2307B1

AD-A174 442 . 8 10/0.20 11/0

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) A Self Consistent Estimate of the Elastic Constants of a Random Array of Equal Spheres with Application to Granular Soil under Isotropic Conditions.

DESCRIPTIVE NOTE: Final rept. 8 May 85-5 May 86,

JUL 86 125P

PERSONAL AUTHORS: Petrakis, Emanuel ; Dobry, Ricardo ;

REPORT NO. RPI-CE-86-04

CONTRACT NO. F49620-85-K-0011

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-86-1050

UNCLASSIFIED REPORT

ABSTRACT: (U) The need for a micromechanical approach to modeling the stress-strain response of granular soil is discussed and justified. The report focuses on the small shear strain ($\gamma < \text{or} = 0.01\%$) behavior, and investigates the validity of analytically modeling uniform, rounded-grained quartz sands by arrays of identical elastic quartz spheres. First the stress-strain properties of 8 regular arrays of spheres are studied, focusing on isotropic and transversely isotropic boundary loading. An analytical procedure is established for determining the elastic moduli of a random assemblage of equal elastic spheres of arbitrary mean porosity, subjected to isotropic confining pressure. The procedure uses the properties of the regular arrays already described, and calculates the macroscopic moduli through porosity, and the self consistent method. The procedure was applied to compute the shear and bulk moduli of assemblages of quartz spheres which were then compared with static and dynamic measurements on quartz sands from the literature. The theoretical sands are significantly stiffer than actual soils due to the lower number of effective

AD-A174 450

AD-A174 442

UNCLASSIFIED

PAGE 171 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 442 CONTINUED

contacts in actual sands. However, excellent agreement was found with resonant column shear modulus measurements on Ottawa sand, after subjecting it to a large number of cycles of shear prestraining which increased the number of contacts toward the theoretical value.

DESCRIPTORS: (U) *SOIL MECHANICS, *SAND, *SOIL MODELS, STRESS STRAIN RELATIONS, SHEAR PROPERTIES, GRANULES, PARTICLE SIZE, LOAD DISTRIBUTION, SPHERES, QUARTZ, ELASTIC PROPERTIES, CONSTANTS, TRANSVERSE, ISOTROPISM, BOUNDARIES, POROSITY, PARTICULATES, MODULUS OF ELASTICITY, VOIDS, RATIOS, ARRAYS, MATHEMATICAL MODELS, ESTIMATES, CONSISTENCY

IDENTIFIERS: (U) Micromechanical models, Small strains, Shear strain, Particulate mechanics, Granular soils, Self consistent method, Ottawa Sand, WJAFOSR2302C1, PE61102F

AD-A174 439 .7 3/O.20 5/O

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Spectroscopy and Reaction Kinetics of Coordinated Unsaturated Metal Carbonyls.

DESCRIPTIVE NOTE: Annual rept. Oct 85-Oct 86.

OCT 86 7P

PERSONAL AUTHORS: Weitz, Eric ;

CONTRACT NO. AFOSR-83-0372

PROJECT NO. 2308

TASK NO. C4

MONITOR: AFOSR
TR-86-1072

UNCLASSIFIED REPORT

ABSTRACT: (U) A program involving the investigation and characterization of reactions of coordinatively unsaturated organometallic species is described. The program emphasizes the measurement of rates of reaction of photolytically produced coordinatively unsaturated species with the parent and rates for cluster formation. Experimental measurements are performed using a time resolved transient absorption apparatus which uses a line tunable CO laser to record spectral and kinetic information by means of probing absorptions in the CO stretch region of the infrared. Systems that have been investigated include coordinatively unsaturated species generated from the Fe(CO)5, Cr(CO)6 and Mn2(CO)10 parents. The results of experiments with these systems are briefly discussed.

DESCRIPTORS: (U) *METAL COMPOUNDS, *CARBONYL COMPOUNDS, *REACTION KINETICS, *INFRARED SPECTROSCOPY, ORGANOMETALLIC COMPOUNDS, PHOTOLYSIS, CLUSTERING, TRANSIENTS, ABSORPTION SPECTRA, CARBON MONOXIDE LASERS, IRON COMPOUNDS, CHROMIUM COMPOUNDS, MANGANESE COMPOUNDS, TUNABLE LASERS

IDENTIFIERS: (U) Continuous Wave Lasers, Diode Lasers, WJAFOSR2306C4, PE61102F

AD-A174 442

AD-A174 439

UNCLASSIFIED

PAGE 172

EVJ58L

UNCLASSIFIED

AD-A174 436 .20 S/O.21 2/0 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L
AD-A174 436 CONTINUED

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Saturation and Spectral Line Behavior in the Resonant
CARS Spectrum of OH.

peak. The frequency splitting between the satellite
components was determined to be independent of laser
intensity and the tuning of the resonant CARS pump
frequency relative to line center.

DESCRIPTIVE NOTE: Final rept. 1 Dec 84-30 Apr 86.

DESCRIPTORS: (U) *RAMAN SPECTROSCOPY, *HYDROXYL RADICALS,
*SATURATION, *SPECTRAL LINES, *COMBUSTION, RAMAN SPECTRA,
COHERENT RADIATION, RESONANCE, TUNABLE LASERS, DYE LASERS,
PULSED LASERS, EXCITATION, RESONANCE, RESONANT FREQUENCY,
SPLITTING, ENERGY TRANSFER

MAY 86 38P

PERSONAL AUTHORS: Verdick, J. F.; Boedeker, L. R. ;

REPORT NO. UTRC/R88-887088F

IDENTIFIERS: (U) CARS(Coherent Antistokes Raman
Spectroscopy), Combustion diagnostics, WUAFOSR2308A3,
PE81102F

CONTRACT NO. F48620-85-C-0014

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-88-1087

UNCLASSIFIED REPORT

ABSTRACT: (U) The origins of the unpredicted satellite
lines about the central resonance of the CARS spectrum
found in a previous study have been explored. The
objectives of the program were to determine the
dependence of the line structure on the input laser
intensities and on tuning of the the resonant frequency.
In the previous AFOSR-supported study, electronically
resonant coherent anti-Stokes Raman spectroscopy (CARS)
of OH was demonstrated for the first time using a flame
source. Theory and experiment were in generally good
agreement, except for the presence of satellite lines
(extra resonances) about the strong central component. In
order to investigate reliably the power dependence of the
resonance CARS spectrum and thereby test for saturation
effects, a single mode, pulsed, tunable dye laser was
utilized to insure selective excitation of a single
resonance. The resultant spectra show clearly that
saturation occurs at input laser pulse energies of the
resonant frequency of about 0.1 millijoules. Saturation
effects are particularly apparent when the CARS pump
frequency is on line center of the selected electronic
transition. Tuning away from line center and/or reducing
input pulse energy produces a notable decrease in the
strength of the satellite lines relative to the central

AD-A174 436

AD-A174 436

UNCLASSIFIED

PAGE 173

EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 435

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AD-A174 435 CONTINUED

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL
ENGINEERING AND MATERIALS SCIENCE

(U) Stress Corrosion Cracking of Wrought and P/M High
Strength Aluminum Alloys.

DESCRIPTIVE NOTE: Final technical rept. 24 Aug 81-30 Jun
86.

SEP 86 23P

PERSONAL AUTHORS: Thompson, A. W. ; Bernstein, I. M. ;

REPORT NO. WENS-AL-9

CONTRACT NO. AFOSR-81-0041

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-1090

UNCLASSIFIED REPORT

ABSTRACT: (U) The major findings from a comprehensive study on the role of microstructure on the susceptibility to environmental embrittlement of high strength aluminum alloys are presented and discussed. Most of the studies used commercial 7075, or a high purity equiaxed version, H7075, or a similar powder version 7090. Through the innovative use of l-loading mode and straining electrode test, stress corrosion cracking was shown to be controlled by the introduction and internal distribution of hydrogen, particularly to grain boundaries. This was the case for the underaged and peak aged microstructures, with the latter being the most susceptible. The SCC behavior of the even more resistant overaged microstructure was shown to be controlled by anodic dissolution processes, predominantly associated with slip bands. Aluminum alloys were also shown to be susceptible to embrittlement under conditions of cathodic polarization correcting a widely held belief that concomitant anodic processes are required. Studies using controlled microstructures were able to rank the importance of different microstructural features to help develop alloy design strategies for more environmentally

AD-A174 435

UNCLASSIFIED

PAGE 174

EVJ56L

resistant alloys--the most effective features are those grain interior precipitates which promote fine, homogeneous slip either by reduced particle cutting or enhanced dislocation generation; fine, grain boundary precipitate free zones were found not to be very important, except in their role in reducing the local strength of the boundary region.

DESCRIPTORS: (U) *STRESS CORROSION, *ALUMINUM ALLOYS, *HIGH STRENGTH ALLOYS, POWDER METALLURGY, HYDROGEN EMBRITTLEMENT, MICROSTRUCTURE, GRAIN BOUNDARIES, AGING(MATERIALS), STRAIN RATE, DISLOCATIONS, CRACK PROPAGATION

IDENTIFIERS: (U) Stress corrosion cracking, Aluminum alloy 7075-T6, Aluminum alloy 7075, Aluminum alloy 7090, MUAFOSR2308A1, PE81102F

UNCLASSIFIED

AD-A174 433 13 9/0 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ86L
AD-A174 433 CONTINUED

NORTH STAFFORDSHIRE POLYTECHNIC STAFFORD (ENGLAND) DEPT
OF MECHANICAL AND COMPUTER-AIDED ENGINEERING

(U) Vibration Control in Rotating Machinery Using Variable
Dynamic Stiffness Squeeze Films. Volume 2.

DESCRIPTIVE NOTE: Annual interim rept. no. 1, Sep 84-Mar
86.

MAR 86 53P

PERSONAL AUTHORS: Goodwin, M. J.; Roach, M. P. ;

CONTRACT NO. AFOSR-84-0368

PROJECT NO. 2302

TASK NO. 81

MONITOR: AFOSR
TR-86-1088-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A174 417.

ABSTRACT: (U) This report describes the current status of a research project whose aim is to develop a hydrostatic bearing, for rotating machinery, whose dynamic characteristics may be tuned during operation of the machine. The purpose of this is to enable the operator to exercise some control over machine critical speeds and vibrations. A computer program has been written which will predict both the static and dynamic characteristics of a hydrostatic bearing. The program allows for the presence of accumulators linked to the hydrostatic bearing recesses via flow restrictors. Output from the computer program has been used as input data to a second computer program which calculates machine vibration amplitude variation with running speed. Theoretical machine characteristics obtained in this way have been used to aid the design of a test rig which will be used to examine the practical performance of the new bearing type being developed.

DESCRIPTORS: (U) *GAS BEARINGS, *HYDROSTATIC PRESSURE, CONTROL, DYNAMIC LOADS, HYDRAULIC ACCUMULATORS, COMPUTER PROGRAMMING, TUNING, VIBRATION, DAMPING

AD-A174 433

AD-A174 433

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 431

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Stable and Efficient 2-D Lattice Filters.

DESCRIPTIVE NOTE: Rept. for 1985-1986.

MAY 86 BP

PERSONAL AUTHORS: Lev-Ari, H.; Parker, S. R.;

CONTRACT NO. N00014-85-K-0612, AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-86-2001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International IEEE Symposium on Circuits and Systems, p695-698 May 86.

ABSTRACT: (U) A cascade lattice parameter filter for multidimensional signals is presented. It inherits the orthogonality property of the Gray Markel normalized lattice, which makes for improved numerical robustness, as well as the structural stability property, which means that the filter is stable for every choice of parameters that satisfies the constraint of orthogonality. An implementation of the lattice sections is presented which has multiple inputs and outputs, as networks of elementary (2×2) orthogonal rotations. Our analysis establishes a fundamental connection between structural stability and the notions of passivity and losslessness. In fact, we show that for a broad family of orthogonal cascade filters structural stability is achieved if, and only if, the filter has passive terminations.

DESCRIPTORS: (U) *ELECTROMAGNETIC WAVE FILTERS, *CASCADE STRUCTURES, *MATHEMATICAL MODELS, CIRCUIT ANALYSIS, TRANSFER FUNCTIONS, LATTICE DYNAMICS, REPRINTS

IDENTIFIERS: (U) Gray Markel Lattice, VLSI/Very Large Scale Integration, Robust Procedures, MUAFOSR2304A6, PB81102F

AD-A174 431

UNCLASSIFIED

AD-A174 429

PAGE 176 EVJ58L

AD-A174 429 .12 2/0

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Two New Series of Search Designs for 3(m) Factorial Experiments.

DESCRIPTIVE NOTE: Interim rept. Dec 85-Jun 86.

JUL 86 17P

PERSONAL AUTHORS: Ghosh, Subir; Zhang, Xiao D.;

REPORT NO. TR-144

CONTRACT NO. AFOSR-86-0046

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2008

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper two new series of search designs with very small number of treatments are presented for 3 superscript m factorial experiments. The first series of designs can search one nonzero two factor interaction and estimate it along with the general mean and the main effects. The second series can search one nonzero three factor interaction and estimate it along with the two factor and lower order interactions.

DESCRIPTORS: (U) *FACTORIAL DESIGN, LINEAR ALGEBRA

IDENTIFIERS: (U) MUAFOSR2304A5, PB81102F

UNCLASSIFIED

AD-A174 428 9 3/O. 17 5/1 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L
AD-A174 428 CONTINUED

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND
AEROSPACE ENGINEERING

(U) Research on Certain Aspects of Laser Diffraction
Particle Size Analysis Relevant to Autonomous Self-
Diagnosing Instrumentation.

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

OCT 85 10P

PERSONAL AUTHORS: Hirleman, E. D. ; Koo, Joseph M. ;

CONTRACT NO. AFOSR-84-0187

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-88-1086

UNCLASSIFIED REPORT

ABSTRACT: (U) The fundamental scientific issues impeding the integration of laser diffraction particle sizing techniques into intelligent sensors for next generation propulsion systems have been identified. This research contributes to the knowledge base necessary to significantly advance the laser diffraction concept. The research addresses three areas, inverse scattering algorithms, multiple scattering, and the problems of laser beam deflections due to refractive index gradients in hostile propulsion environments. Progress has been made in the development of direct integral transform techniques for the inverse problem which potentially can operate at frequencies on the order of 10 kHz as needed for propulsion system sensors. Adequate inversion performance on bimodal distributions with signal to noise ratios as low as 10% has been demonstrated. The multiple scattering problem has been formulated as a matrix operation, and a corresponding scheme for the inversion of diffraction data under multiple scattering conditions has been proposed. A prototype computer generated hologram which generates a hollow cone of scattered light has been fabricated. Experiments are underway to demonstrate the usefulness of this development to the inverse multiple scattering problem.

AD-A174 428

Finally, a concept to allow laser diffraction particle sizing sensors to function autonomously in environments where transient beam deflections are significant has been proposed and proof of principle experiments have begun.

DESCRIPTORS: (U) *LASER TARGET INTERACTIONS.
*BACKSCATTERING, *PARTICULATES, *INFRARED SIGNATURES.
DIFFRACTION ANALYSIS, SIZES(DIMENSIONS), COMBUSTION
PRODUCTS, DATA REDUCTION, HOLOGRAMS, COMPUTER
APPLICATIONS, SIGNAL TO NOISE RATIO, INTEGRAL TRANSFORMS,
BEAM STEERING, LASER BEAMS

IDENTIFIERS: (U) Bimodal Distribution Functions.
Multiple scattering, Inverse Problems, WUAFOSR2308A3,
PE61102F

IAC NO. NT-035580

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) TEST EQUIPMENT, SENSORS,
PARTICLE SIZE, LASERS, DIFFRACTION, PROPULSION,
SCATTERING, PROTOTYPES, HOLOGRAPHY, RESEARCH, DIAGNOSTICS,
ENVIRONMENTAL EFFECTS, AUTOMATION, ARTIFICIAL
INTELLIGENCE, ALGORITHMS, FORMULAS(MATHEMATICS),
DEVELOPMENT, CALIBRATION, ON LINE SYSTEMS;

UNCLASSIFIED

PAGE 177 EVJ56L

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 427 7 4/O.12 9/O.20 8/O.20 12/O AD-A174 427 CONTINUED
SPUTTERING, SUBSTRATES, IONS, SODIUM, POTASSIUM, OPTICAL PUMPING

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Signal Processing with Degenerate Four-Wave Mixing.

DESCRIPTIVE NOTE: Annual rept. 1984-1985.

AUG 86 14P

PERSONAL AUTHORS: Stegeman, George ;

CONTRACT NO. AFOSR-84-0277

PROJECT NO. 2305

TASK NO. 84

MONITOR: AFOSR
TR-86-1078

UNCLASSIFIED REPORT

ABSTRACT: (U) We have made progress in a variety of areas within this program since our original report of DFWM in a thin film waveguide. That original experiment utilized liquid carbon disulphide (CS₂) as the nonlinear mixing medium in the form of a cladding on a planar sputtered 7059 glass waveguide. A number of obvious deficiencies exist in configuration: (a) the physical form of the nonlinear medium (ie a liquid is not very practical), (b) the optical field strength in the nonlinear medium is small since only the evanescent tails of the guided mode exist in the nonlinear cladding, and (c) the magnitude of the nonlinear index in CS₂ is approx. 10 to the minus 18th power per sq m per v is not particularly high. To improve upon these deficiencies what is required is a nonlinear material preferable in a practical solid form which can be formed into low loss optical waveguides. Semiconductor doped glasses were identified as an excellent candidate material to meet these requirements. This is a glass host containing mixtures of CdS and CdSe compounds semiconductor crystallites.

DESCRIPTORS: (U) *MIXING, *INFORMATION THEORY, *THIN FILMS, *CARBON DISULFIDE, *CADMIUM SULFIDES, *CADMIUM SELENIDES, *WAVEGUIDES, NONLINEAR SYSTEMS, LIQUIDS, REFRACTIVE INDEX, SEMICONDUCTORS, RESPONSE, DOPING.

AD-A174 427

AD-A174 427

UNCLASSIFIED

PAGE 178

EVJ58L

IDENTIFIERS: (U) DFWM(Degenerate Four Wave Mixing), Conjugates, Waves(Degenerate), Mixing(Four wave), Cladding, Degeneracies, Nonlinear optics, Probe beams, Pulse responses, WUAFO5R230584, PE81102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 419 .7 3/0.19 1/0.20 5/0

AD-A174 418 .12 3/0

DELAWARE UNIV NEWARK DEPT OF CHEMISTRY

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Structure/Property/Reactivity Relationships Among Nitramines and Newer Energetic Materials.

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

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-30 Sep 86.

DESCRIPTIVE NOTE: Technical rept.,

OCT 86 14P

JUL 86 12P

PERSONAL AUTHORS: Brill, Thomas B. ;

PERSONAL AUTHORS: Stufken, John ;

CONTRACT NO. AFOSR-85-0353

REPORT NO. TR-88-10

PROJECT NO. 2308

CONTRACT NO. AFOSR-85-0320

TASK NO. A1

PROJECT NO. 2304

MONITOR: AFOSR TR-88-1088

MONITOR: AFOSR TR-88-1092

UNCLASSIFIED REPORT

ABSTRACT: (U) Rapid-scan infrared spectroscopy studies of the high rate thermolysis of energetic molecules containing CN_2 , NN_2 , ON_2 , N_3 , NO_3 (-), IR spectroscopy, DSC, solid-state NMR and X-ray crystallography have been conducted. Structure/property/reactivity relationships have been established for the formation of N_2 and HONO . Understanding of some of the factors influencing the formation of CH_2O , N_2O and NO has also been acquired. The influence of the static applied pressure on the first observed decomposition products has been explored successfully.

DESCRIPTORS: (U) *NITRAMINES, *ENERGETIC PROPERTIES, *PYROLYSIS, *INFRARED SPECTROSCOPY, NITRATES, ESTERS, CHLORATES, FUROXANES, SALTS, FUROXANES, PHASE TRANSFORMATIONS, SOLID PHASES, MOLECULAR STRUCTURE, AZIDES, NITRO RADICALS, PRESSURE, CRYSTALLOGRAPHY

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A1

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers the problem of comparing test treatments with a control in a proper block design. The author derives sufficient conditions for the A-optimality of both R-type and S-type designs, and demonstrates how these conditions can be used to obtain families of optimal designs. He gives an example for the construction of the desired S-type designs. A table with optimal R-type designs ($3 > \text{or} = k > \text{or} = 10$, $k > \text{or} = v > \text{or} = 30$) is also given.

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, PARAMETERS, INEQUALITIES, OPTIMIZATION, THEOREMS, STATISTICAL TESTS

IDENTIFIERS: (U) Block Design, PE61102F, WJAFOSR2304A5

AD-A174 419

AD-A174 418

UNCLASSIFIED

PAGE 179

EVJ56L

UNCLASSIFIED

AD-A174 417 .13 7/0.13 9/0 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L
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NORTH STAFFORDSHIRE POLYTECHNIC STAFFORD (ENGLAND) DEPT machinery, PE81102F, WUAFOSR230281
OF MECHANICAL AND COMPUTER-AIDED ENGINEERING

(U) Vibration Control in Rotating Machinery Using Variable
Dynamic Stiffness Squeeze-Films. Volume 1.

DESCRIPTIVE NOTE: Annual rept. no. 1 Sep 84-Mar 86,

MAR 86 52P

PERSONAL AUTHORS: Roach M. J. /Goodwin, M. P. ;

CONTRACT NO. AFOSR-84-0368

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-1098-VOL-1

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the current status of a research project whose aim is to develop a hydrostatic bearing, for rotating machinery, whose dynamic characteristics may be tuned during operation of the machine. The purpose of this is to enable the operator to exercise some control over machine critical speeds and vibrations. A computer program has been written which will predict both the static and dynamic characteristics of a hydrostatic bearing. The program allows for the presence of accumulators linked to the hydrostatic bearing recesses via flow restrictors. Output from the computer program has been used as input data to a second computer program which calculates machine vibration amplitude variation running speed. Theoretical machine characteristics obtained in this way have been used to aid the design of a test rig which will be used to examine the practical performance of the new bearing type being developed.

DESCRIPTORS: (U) *GAS BEARINGS, *HYDROSTATIC PRESSURE, LUBRICATING FILMS, MACHINES, CONTROL, VIBRATION, COMPUTER PROGRAMMING, MATHEMATICAL PREDICTION, DYNAMIC LOADS, ROTATION, THIN FILMS, LITERATURE SURVEYS

IDENTIFIERS: (U) Squeeze film bearings, Rotating

AD-A174 417

AD-A174 417

UNCLASSIFIED

PAGE 180

EVJ56L

UNCLASSIFIED

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(U) Joint Services Electronics Program.			(U) Are Mass Extinctions Really Periodic?		
DESCRIPTIVE NOTE: Final rept. 1 Apr 82-31 Mar 86.			DESCRIPTIVE NOTE: Technical rept.,		
SEP 86	238P		OCT 86	8P	
PERSONAL AUTHORS: Powers, Edward J. ;			PERSONAL AUTHORS: Ross, Sheldon M. ;		
REPORT NO.	TR-33		REPORT NO.	ORC-86-19	
CONTRACT NO.	F49620-82-C-0033		CONTRACT NO.	AFOSR-86-0153	
PROJECT NO.	2305		PROJECT NO.	2304	
TASK NO.	A9		MONITOR:	AFOSR	
MONITOR:	AFOSR		TR-87-0032		
	TR-86-0622				

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes progress on projects carried out at the Electronics Research Center at The University of Texas at Austin and which were supported by the Joint Services Electronics Program. In the area of Information Electronics progress is reported for projects involving (1) nonlinear detection and estimation, (2) electronic multi-dimensional signal processing, (3) electronics time-variant signal processing, and (4) digital time series analysis with applications to nonlinear wave phenomena.

DESCRIPTORS: (U) *SOLID STATE ELECTRONICS, *QUANTUM ELECTRONICS, NONLINEAR SYSTEMS, SIGNAL PROCESSING, DIGITAL SYSTEMS, INTERFACES, TRANSPORT PROPERTIES, EXCITATION

IDENTIFIERS: (U) Information electronics, Electromagnetics, PE81102F, WJAFOSR2305A9

UNCLASSIFIED REPORT

ABSTRACT: (U) It is argued that the analysis of family extinction data that resulted in the claim of a 26 Myr periodicity of mass extinctions was flawed in that it did not allow for the possibility of a symmetric random walk model, which is shown to be perfectly consistent with the data. (Author)

DESCRIPTORS: (U) *PALEONTOLOGY, *STATISTICAL ANALYSIS, EXTINCTION, CYCLES, CHI SQUARE TEST

IDENTIFIERS: (U) Random Walk, PE81102F

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STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

ENVIRONMENTAL RESEARCH INST OF MICHIGAN ANN ARBOR

(U) Infrared-Laser Excitation of the Internal Vibrational Mode of a Diatomic Molecule Adsorbed on a Metal Surface.

(U) Diffraction-Limited Imaging of Space Objects III.

DESCRIPTIVE NOTE: Technical rept.,

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

NOV 88 39P

OCT 86 227P

PERSONAL AUTHORS: Peremans, Andre ;Darville, Jacques ;
Gillies, Jean-Marie ;George, Thomas F. ;

PERSONAL AUTHORS: Fienup, James R. ;Wackerman, Christopher C. ;

REPORT NO. UBUFFALO/DC/86/TR-17

REPORT NO. ERIM-181900-20-F

CONTRACT NO. N00014-86-K-0043, F49620-88-C-0008.

CONTRACT NO. F49620-82-K-0018

MONITOR: AFOSR
TR-87-0369MONITOR: AFOSR
TR-86-2109

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The infrared laser excitation of the internal vibrational mode of a diatomic molecule adsorbed on a metal by electron hole excitations. Simple expressions for the populations of the vibrational levels, the mean number of vibrational quanta and the rate of energy transfer between the infrared laser and the metal surface at the steady state are derived. An equation of evolution can readily be solved numerically to determine the time necessary to reach this steady state. The criteria of applicability of the Markov approximation (which leads to the golden rule) is clearly established, where it is seen that this approximation may not be used to compute the evolution of the populations of the vibrational levels. The random phase approximation is shown to give the correct kinetic equation for the populations of the vibrational levels. The excitation of carbon monoxide adsorbed on a copper surface is analyzed quantitatively.

DESCRIPTORS: (U) *LASER PUMPING, *MOLECULAR VIBRATION, *DIATOMIC MOLECULES, MARKOV PROCESSES, ADSORBATES, HOLES(ELECTRON DEFICIENCIES), COPPER, CARBON MONOXIDE, DAMPING, QUANTIZATION

ABSTRACT: (U) This report investigate methods for obtaining diffraction limited images of space objects, despite the turbulent atmosphere, by reconstructing images from data provided by optical interferometers (particularly stellar speckle interferometry). Major accomplishments include the following: (1) A new closed form recursive algorithm was invented for reconstructing sampled objects having latent reference points. (2) Improvements in the iterative Fourier transform algorithm were devised, solving the stagnation problems of stripes and of simultaneous twin images. (3) Uniqueness of the reconstructed image was demonstrated empirically. (4) Reconstruction of complex valued objects was shown to be possible. (5) The Hayes Quatieri recursive algorithm was shown to suffer from a uniqueness problem, and that algorithm was generalized. (6) An improved method for estimating the object's Fourier modulus from stellar speckle interferometry data was devised.

DESCRIPTORS: (U) *IMAGE PROCESSING, *ASTRONOMY, *DISTORTION, *ATMOSPHERIC REFRACTION, ALGORITHMS, RECURSIVE FUNCTIONS, DIFFRACTION ANALYSIS, SPECULAR REFLECTION, OPTICAL INTERFEROMETERS, TURBULENCE, ATMOSPHERIC MOTION, BOUNDARY VALUE PROBLEMS

IDENTIFIERS: (U) *Speckle interferometry, Hayes Quatieri Algorithm, Uniqueness

AD-A174 211

AD-A174 100

UNCLASSIFIED

PAGE 182 EVJ56L