

**C A M S**

**Center for Applied Mathematics and Statistics**

**ANNUAL REPORT**

**January 1996 - June 1997**

# **NJIT**

## **New Jersey Institute of Technology**

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## I. FROM THE DIRECTOR

CAMS exists to promote and sustain research excellence in the mathematical sciences at NJIT. In the period of this report (January 1996 through June 1997), CAMS has enjoyed significant progress in several important areas thanks to the efforts of its members.

\* New and continued external funding of research projects has far exceeded our most ambitious plans of several years ago. This level of activity has made the need to establish infrastructure and culture supporting research all the more urgent.

\* New members have solidified our strengths in wave propagation, fluid dynamics and statistics and broadened the scope of biomathematics to include neuroscience.

\* The successful defense of the first doctoral thesis in the mathematical sciences at NJIT symbolizes the beginning of a phase in our development where graduate students have an important role to play

in the intellectual life of CAMS.

\* A reorganization of the space assignments in the College of Science and Liberal Arts has relieved some of the difficulties arising from the shortage of research space.

\* The creation of the CAMS Statistical Consulting Laboratory offers a new way for CAMS members to make their expertise available to the wider scientific and technological community.

Although strained by the explosive growth in external funding over the past few years, our research infrastructure continues to develop and mature at a brisk pace. The CAMS Seminar series has brought us

the ideas and work of prominent members of the scientific community in academia, government and industry. The NSF SCREMS, program with matches from NJIT, has allowed the CAMS/Math Computation Laboratory to upgrade its facilities to include three high-end SGI Indigo 2 workstations and allow us to enjoy professional systems administration that has significantly enhanced our ability to bring the raw power of machines like these to bear on scientific problems. The implementation of the Capstone Laboratory (funded by the NSF ILI program with matches from NJIT) has opened an avenue for undergraduate students to become involved in research.

CAMS still faces many challenges. Development and effective management of space for research activities is still a priority. The network connecting our computational resources is aging. Further support for publication and editorial activities, both traditional publication and electronic publication, is needed. Developing the promise of the Statistical Consulting Laboratory will require significant effort. Perhaps the biggest challenge facing all of us is the development of the management skills needed to efficiently utilize the resources available to do better science. The vigor and dedication of CAMS members gives us faith the next year's report will include a healthy amount of progress towards meeting these challenges.

The accomplishments of CAMS are built on the efforts and support of many individuals. CAMS is grateful to President Saul Fenster for his vision that has created an environment where the aspirations of CAMS are espoused and appreciated. CAMS is also indebted to Provost Gary Thomas for his pivotal role in realizing this vision and in particular for his unflagging assistance and support. Robert Pfeffer, Vice President for Research and Graduate Studies, has provided assistance with external funding of research projects. John Poate, since his arrival at NJIT as Dean for the College of Science and Liberal Arts in January of 1997, has encouraged CAMS through his support of scientific research and his assistance with the cultivation of industrial contacts. And finally CAMS is very appreciative of the deep commitment of Gregory A. Kriegsmann, Foundation Chair of Applied Mathematics, whose generous supply of resources, advice, and energy have been instrumental in our ongoing success. Secretarial support for CAMS has been provided by the Mathematics Department and the Foundation Chair.

Daljit S. Ahluwalia-Director Jonathan Luke-Associate Director

## II. MISSION AND ACTIVITIES

The Center for Applied Mathematics and Statistics (CAMS) was established in 1986 to promote research in the mathematical sciences at the New Jersey Institute of Technology. Members of the Department of Mathematics naturally form the core of CAMS membership, but the importance of mathematics for science and technology has made CAMS an interdisciplinary organization. The formal structure of CAMS consists of the Director, Associate Director, the committees on research, seminars, computation, publications, and statistical consulting. But the essential nature of the organization is that of a voluntary association of individual researchers of many disciplines joined in a collegial collaboration to enhance mathematical work at NJIT.

CAMS undertakes a wide range of activities in pursuing its mission. CAMS brings researchers from academia, industry, and government to NJIT and other institutions by organizing interdisciplinary workshops and by bringing together researchers whose strengths are complementary and whose goals are common. In some cases, CAMS secures the appointment of Research Professors to formalize this relationship so that grants can be jointly pursued. CAMS provides its member with laboratory support by maintaining the CAMS/Math Computational Laboratory, the NSF Capstone Laboratory, and the Statistical Consulting Laboratory. CAMS activities also include support for the submission of research proposals, which is done through dissemination of assistance to proposers. Senior members of CAMS commit a significant amount of time and effort in providing guidance and advice to young researchers in their efforts to obtain funding.

In the future, CAMS hopes and expects to maintain its high standards of professionalism and scholarship and plans to extend its activities to include fostering student research and developing long-term relationships with industry.

### **III. MEMBERSHIP AND VISITORS**

#### **Department of Mathematics**

Ahluwalia, Daljit S. Kriegsmann, Gregory Andrushkiw, Roman Lacker, Michael

Bechtold, John Luke, Jonathan

Bhattacharjee, Manish Michalopoulou, Zoi-Heleni

Blackmore, Denis Milojevic, Petronije

Booth, Victoria Papageorgiou, Demetrios

Booty, Michael Perez, Manuel

Bose, Amit Porter, Michael

Bukiet, Bruce Ray, Bonnie

Crato, Nuno Siegel, Michael

Dhar, Sunil Sran, Kewal

Dios, Rose Stickler, David

Goldberg, Vladislav Tavantzis, John

Hile, Cheryl Tilley, Burt

### **Department of Mechanical Engineering**

Aubry, Nadine

Dave, Rajesh

Rosato, Anthony

### **Department of Civil & Environmental Engineering**

Meegoda, Namunu

### **CAMS Research Professors**

Chaudhry, Hans

Erneux, Thomas



Findley, Thomas

Taroudakis, Michael

Prykarpatsky, Anatoliy

Reisen, Valderio Anselmo

### **Visiting Research Professor**

Booker, Stuart

Villamizar, Vianey

### **Long and Short-Term Visitors**

Chopra, Dharam Wichita State University, Kansas City, MO

Taroudakis, Michael University of Crete, Greece

Strang, Gil Massachusetts Institute of Technology (MIT), Cambridge, MA

Cohen, Donald California Institute of Technology, Pasadena, CA

Erneux, Thomas Univ Libre Brussels, Belgium

Silberglitt, Richard FM Technologies, Fairfax, VA

Holmes, Philip Princeton University, Princeton NJ

Otilio Rojas Universidad Central de Venezuela, Caracas, Venezuela

Prykarpatsky, Anatoliy Institute of Mathematics at AGH, Krakow, Poland

## **IV. SEMINARS AND WORKSHOPS**

### **A. THE CAMS/MATH SEMINAR SERIES**

**Denis Blackmore:** Department of Mathematics & CAMS, NJIT Institute of Technology, Newark, NJ

*A Simple Dynamical System Model for Phyllotaxis*

**Joyce R. McLaughlin:** Department of Mathematical Sciences, Rensselaer Polytechnic, Troy, NY

*Finding Sound Speed and Electric Permittivity from Interior Transmission Eigenvalues*

**Percy Deift:** Courant Institute of Mathematical Sciences, New York University, New York, NY

*Forced Lattice Vibrations*

**Mary Pugh:** Courant Institute of Mathematical Sciences, New York University, New York, NY

*Thin Jets with Surface Tension*

**Marianthi Markatou:** Department of Statistics, Columbia University, New York, NY

*Weighted Likelihood Estimating Equations: The Continuous Case*

**Monike Nitsche:** Inst. for Mathematics and its Applications, University of Minnesota, Minneapolis, MN

*Computation of Vortex Sheet Motion*

**Marcus J. Grote:** Courant Institute of Mathematical Sciences, New York University, New York, NY

*Nonreflecting Boundary Conditions*

**Vladislav Goldberg:** Department of Mathematics & CAMS, NJIT, Newark, NJ

*Demonstration of the Video: Touching Soap Films*

**Raymond E. Goldstein:** Department of Physics, Princeton University, Princeton, NJ

*The Geometry of Nonlinear Dynamics from Turning Patterns to Supercomputers*

**Jeffrey McFadden:** National Institute of Standards & Technology, Gaithersburg, MD

*A Phase-Field Model of Order-Disorder Transitions in an FCC Crystal*

**Victoria Booth:** National Institute of Health, Mathematical Research Branch, Bethesda, MD

*Modeling Bistability of Motoneuron Firing Patterns*

**Eugene C. Gartland:** Department of Mathematics, Kent State University, Ohio

*Numerical Investigation of a Stripe Instability in Liquide Crystal Films*

**Mary C. Kropinski:** Department of Mathematics, Simon Fraser University, Burnaby, BC Canada

*Integral Equation Methods for Low Reynolds Number Flow*

**Leo Korn:** Veterans Administration Hospital, East Orange, NJ

*Robust Estimation for Left Censored Data with Applications to Chemical Concentrations*

**James J. Quirk:** Graduate Aeronautical Laboratories, California Institute of Technology, Pasadena, CA

*Adaptive Mesh Refinement Interactive Teaching Aid*

**John Spiesberger:** Department of Meterology, Penn State University, University Park, PA

*Mapping Climatic Temperature Variability in the Ocean with Sound*

**Nairanjana Dasgupta:** Department of Mathematics, South Carolina State University, Columbus, SC

*Comparison to Control in Logistic Regression Framework*

**Stuart Booker:** Department of Mathematics & CAMS, NJIT, Newark, NJ

*Modelling Transient Antennas Using the Electric Field Integral Equation*

**Lothar Reichel:** Department of Mathematics, Kent State University, Kent, Ohio

*Iterative Methods for Large Ill-Posed Problems*

**Kay Tatsuoka:** Department of Statistics, Rutgers University, New Brunswick, NJ

*On M-Estimates, S-Estimates, and CM-Estimates*

**Agnes Kovacs:** Department of Mathematical Sciences, University of Delaware, Newark, DE

*Statistical Modeling of Strength of Single Fibers the Competing Risks Weibull Model*

**Nuno Crato:** Department of Mathematical Sciences, Stevens Institute of Technology, Hoboken, NJ

*Global Warming Uncertainty: A Time Analysis*

**Dharam V. Chopra:** Department of Mathematics & Statistics, Wichita State University, KS

*On Certain Matrices with a Combinatorial Structure*

**Anthony Rosato:** Department of Mechanical Engineering & CAMS, NJIT, Newark, NJ

*On the Behavior of Vibrating Granular Beds*

**Balaji Rajagopalan:** Lamont-Doherty Earth Observatory, Columbia University, NY

*Nonparametric Functional Estimation: Recent Applications to Geophysical Time Series*

**Jay Kappraff:** Department of Mathematics, NJIT, Newark, NJ

*A Guided Tour Through Prehistory and Unexplained Phenomena*

**Richard B. Pelz:** Dept. of Mechanical and Aerospace Engineering, Rutgers University, Piscataway, NJ

*A Finite-time Singularity in Ideal Hydrodynamics*

**Rachel Kuske:** Department of Mathematics, Tufts University, Medford MA

*Probability Densities for Dynamics Simplified By Noise*

**Gilbert Strang:** Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA

*Wavelets from Filter Bands*

*Wavelets from Filter Bands: Part II Applications*

**Jelena Kovacevic:** Bell Laboratories, Murray Hill, NJ

*Wavelets and Subband Coding*

**Michael Brenner:** Dept. of Applied Math., Massachusetts Institute of Technology, Cambridge, MA

*Sonoluminescence: Lightening Storm in a Bubble*

**David Muraki:** Courant Institute of Mathematical Sciences, New York University, New York, NY

*Irregular Patterns in a Reaction/Diffusion System*

**Yuriko Renardy:** Department of Mathematics and Interdisciplinary Center for Applied Mathematics

Virginia Polytechnic Institute and State University, Blacksburg, VA

*Snakes and Corkscrews in Core-Annular Flow of Two Fluids*

**Donald Cohen:** Department of Applied Mathematics, California Institute of Technology, Pasadena, CA

*New Asymptotic Scales for Moving Boundary Diffusion Problems: Controlled Release Drug Delivery*

**Orest Diachok:** Navy Research Laboratory, Washington, DC

*Fish Absorption Spectroscopy*

**Nathan Kutz:** Department of Mathematics, Princeton University, Princeton, NJ

*Asymptotic Behavior of the Nonlinear Schrodinger Equation with a Rapidly-Varying Dispersion*

**David Stickler:** Department of Mathematics & CAMS, NJIT, Newark, NJ

*A Model for Deformation of the Iris and the Optic Disc*

**Prabir Daripa:** Texas A&M University, College Station, TX

*An Application Driven Fast Algorithm for Elliptic (Fluid) Problems*

**Yehekel Barness:** Department of Electrical and Computing Engineering, NJIT, Newark, NJ

*The Complex Bootstrap Algorithm for Blind Signal Separation of Co-Channel QAM Signals*

**Charles Doering:** Department of Mathematics, University of Michigan, Ann Arbor, MI

*Convection, Stability and Turbulence*

**Andrew Bernoff:** Dept. of Engineering Science & Applied Math., Northwestern University, Evanston, IL

*Longwave Models of Solidification: Self-similar Blow-up and Its Regularization*

**Dawn Lott-Crumpler:** Department of Mathematics, University of Maryland at College Park, MD

*The Quasilinear Wave Equation Governing Antiplane Motions of Nonlinearly Elastic Bodies: A Numerical Approach*

**Mei Zhu:** Department of Mathematics, Lafayette College, Easton, PA

*Mathematical Models for Biological Pattern Formation*

**Hans Chaudhry:** Center for Applied Mathematics and Statistics, NJIT, Newark, NJ

*Mathematical Modeling of Stresses and Displacement Resulting from Suturing Wounds*

**Tasso Kaper:** Department of Mathematics, Boston University, Boston, MA

*Waves in 1-D Self-Replicating Pulse Equations*

**Brian McCartin:** Science and Mathematics Department, GMI Engineering and Management, Flint, MI

*Perturbation and Numerical Methods for Cylindrical Waveguides*

**Ljubinko Kondic:** Courant Institute of Mathematical Sciences, New York University, New York

*Shear-thinning and the Saffman-Taylor Instability in Hele-Shaw Flows*

**Andreas Buja:** AT&T, Bell Laboratories, Murray Hill, NJ

*Dynamic Projection in High-dimensional Data Visualization*

**W.E. Olmstead:** Dept. of Engineering Sciences & Applied Math., Northwestern University, Evanston, IL

*Critical Speed for the Avoidance of Blow-up in a Reactive-Diffusive Medium*

**Jeffery Grende:** Exxon Research and Engineering, Annadale, New Jersey

*CFD Analysis of Chemically Reacting Flowfield in Rocket Propulsion*

**F. Jay Breidt:** Department of Statistics, Iowa State University, Ames, IA

*Bayesian Analysis of Fractionally Integrated ARMA with Additional Noise*

**John Rinzel:** Mathematical Research Branch, National Institutes of Health, Bethesda, MD

*Reflected Waves in a Inhomogeneous Nerve Axon*

**William D. Lakin:** Department of Mathematics & Statistics, University of Vermont, Burlington, VT

*Mathematical Modeling of Intracranial Pressure Dynamics*

**Ralph Menikoff:** Los Alamos National Laboratory, Los Alamos, NM

*Triple Shock Entropy Theorem and Its Consequences*

**Michael Recce:** Dept. of Anatomy & Developmental Biology, University College London, England

*Computational Modeling of the Hippocampus*

**George Gilmer:** AT&T, Bell Laboratories, Lucent Technologies, Murray Hill, NJ

*Simulations of the Fabriciation of Si Devices*

**Daniel D. Joseph:** Aerospace Engineering & Mechanics University of Minnesota

*How Bubbly Mixtures Foam and How to Suppress Foaming by Fluidizing Particles*

## **B. CAMS WORKSHOPS**

### **CAMS Workshop on Methods for Electromagnetic Scattering From Cavities**

Session 1: Gregory A. Kriegsmann, Department of Mathematics & CAMS

*Hybrid Methods in E&M Scattering and Propagation: Cavity Problems*

Session 2: Cheryl Hile and Vianey Villamazar, Department of Mathematics & CAMS

*Numerical Methods*

Session 3: Discussion: *Reciprocity, Integral Equations, and Impedance*

## **V. CAMS 1996 SUMMER RESEARCH PROGRAM FOR STUDENTS**

### **A. PARTICIPANTS**

#### **Graduate Student Project Advisor**

John Pelesko Gregory A. Kriegsmann

John Gilchrist Cheryl Hile



Zili Huang John Bechtold

Bhavana Gupta Michael Lacker

Brian Mullaghy Gregory A. Kriegsmann

Helen Martynov Michael Porter

Fu Li John Bechtold/Gregory A. Kriegsmann/Michael Booty

Yanping Wang Demetrius Papageorgiou

Peiwen Hou Jonathan Luke

Juan Gomez Michel Booty

Matthew Charlap Madeleine Rosar

Ming Tang Michael Siegel

Jennifer Nelson Bonnie Ray

### **Undergraduate Student Project Advisor**

Brandy Rapatsky Cheryl Hile

Christian Donzella Gregory A. Kriegsmann

### **B. CAMS GRADUATE RESEARCH SEMINAR:**

**Organizer: Jonathan Luke**

**John Pelesko:** *Microwave Heating of Ceramic Laminates*

**Jonathan Luke:** *A Numerical Method for Linear Hyperbolic Systems*

**John Gilchrist:** *Fluid Motions Within a Microwave Heated Layer*

**Cheryl Hile:** *A Hybrid Numerical Method for Modeling: Microwave Sintering Experiments*

**Zili Huang:** *Response of a Weakly Stretched Flame in an Oscillating Stagnation Point Flow*

**Michael Booty:** *An Overview of Combustion Theory*

**Bhavana Gupta:** *Numerical Implementation of a Generalized N-Segment Model of Human Motion*

**Brian Mullaghy:** *Heating and Cooling Rates in Simple Geometric Objects*

**Helen Martynov:** *WKB Approximation for Normal Modes Solution of the Depth-dependent Ocean Acoustic Problem*

**Fu Li:** *Microwave-Assisted Combustion*

**Yanping Wang:** *Theoretical Study of Remobilizing a Surfactant Retarded Fluid-Particle Interface*

**Michael Siegel:** *Effect of Anisotropy in Evolving Fluid Interfaces*

**Peiwen Hou:** *Einstein's Theory of Effective Viscosity*

**Zoi-Heleni Michalopolou:** *Inverse Problems in Underwater Acoustics: Matched-Field Processing*

**Juan Gomez:** *Droplet Burning*

**Gregory A. Kriegsmann:** *Hot Spots in Microwave Heated Fibers*

**Matthew Charlap:** *Stability of Collapsible Tubes*

**Ming Tang:** *Boundary Integral Methods for Vortex Sheet Motion*

**Jennifer Nelson:** *Simulation and Estimation of Multivariate ARFIMA Models*

## **VI. EXTERNALLY FUNDED RESEARCH**

### **A. NEW PROJECTS (Beginning in 1996)**

#### *1. Capstone Courses in Applied Mathematics and Statistics*

National Science Foundation: July 1996 - June 1998

Daljit S. Ahluwalia

Bruce Bukiet

Bonnie Ray

*2. Experimental Mathematics Program*

Victoria Foundation: January 1996 - December 1996

Rose Dios

*3. Experimental Mathematics Program*

Exxon Research and Engineering Corporation: January 1996 - December 1997

Rose Dios

*4. Asymptotic & Singular Perturbation Methods for Bifurcation Problems with Applications*

National Science Foundation August 1996 - July 1999

Thomas Erneux

*5. Mathematical Sciences: Microwave Processing of Ceramic Materials*

National Science Foundation: July 1996 - June 1997

Gregory A. Kriegsmann

*6. Scattering by Large and Complex Structures*

Air Force Office of Scientific Research: February 1996 - June 2001

Gregory A. Kriegsmann

Cheryl Hile

Jonathan Luke

*7. Motion Analysis Performance Systems*

St. Joseph Hospital Medical Center: June 1996 - June 1997

Michael Lacker

8. *Computationally Intensive Methods for Time Series Analysis with Environmental & Economic Applications*

National Science Foundation: (Career Award) July 1996 - June 2000

Bonnie K. Ray

9. *Interfacial Patterns in Two-layer Flow in an Inclined Channel*

NSF-NATO Postdoctoral Research Fellowship: June 1996 - May 1997

Burt Tilley

## **B. NEW PROJECTS (Begininning in 1997)**

1. *A Student-Designed Experiment to Analyze Particles Collected During a NASA Balloon Flight*

National Aeronautics and Space Administration: May 1997 - April 1998

Bruce Bukiet

2. *Time Series Econometrics: Some Research Topics*

CEMAPRE Technical University of Lisbon: June 1997

Nuno Crato

3. *Experimental Mathematics Program*

Victoria Foundation: January 1997 - December 1997

Rose Dios

*4. Applied Mathematical Problems in Microwave Processing of Ceramic Materials*

Department of Energy: February 1997 - January 2000

Gregory A. Kriegsmann

*5. Ocean Acoustics and Signal Processing*

Office of Naval Research: (Young Investigator Program) March 1997 - June 2000

Zoi-Heleni Michalopoulou

*6. Broadband Inversion in Shallow Water*

Office of Naval Research: February 1997 - October 1998

Michael Porter

**C. Continuing Funded Projects (Beginning Before 1996)**

*1. Mathematical Modelling and Dynamics of Premixed Flames as Hydrodynamic Discontinuities*

National Science Foundation: July 1995 - June 1998

John Bechtold

*2. Applications of Sweep Differential Equations to Automated Manufacturing*

National Science Foundation: September 1995 - August 1998

Denis Blackmore

*3. Experimental Mathematics*

Victoria Foundation: (CPCP Industry) May 1995 - December 1997

Rose Dios

4. *Asymptotic and Singular Methods for Bifurcation Problems with Applications*

National Science Foundation: June 1993 - May 1996

Thomas Erneux

5. *Mathematical Studies of Wave Propagation*

National Science Foundation: June 1995 - November 1996

Cheryl Hile

6. *Development of Model-based Matched-filter Processing for Time-dispersive Ocean Channels*

Canadian Department of National Defense (DREA)

Michael Porter

Zoi-Heleni Michalopolou

7. *Shallow-water Broadband Detection and Localization*

Office of Naval Research: February 1995 - February 1997

Michael Porter

8. Expansion Request: *Shallow-water Broadband Detection and Localization*

Office of Naval Research: February 1995 - February 1997

Michael Porter

9. *Acoustic Inversion for Tidal Currents*

PRAXIS/JNICT: (Portuguese Ministry of Science and Technology) June 1995 - June 1997

Michael Porter

10. *Statistical Analysis of NJIT I/M Study*

Hazardous Substance Management Research Center: June 1995 - June 1996

Bonnie Ray

Manish Bhattacharjee

Sunil Dhar

11. *Marine Mammal Localization*

National Science Foundation: August 1995 - July 1996

Zoi-Heleni Michalopoulou

12. *Mathematical Sciences Computing Research Environments*

National Science Foundation: (SCREMS) July 1995 - July 1997

Jonathan Luke

John Bechtold

Bruce Bukiet

Gregory A. Kriegsmann

Zoi-Heleni Michalopoulou

13. *Applied Mathematical Problems in Microwave Processing of Ceramic Materials*

Department of Energy: June 1994 - February 1997

Gregory A. Kriegsmann

14. *The Modulation of Flames of Various Types in a Premixed Preactive Atmosphere*

National Science Foundation: July 1994 - June 1997

Michael Booty

15. *Data Driven Modeling and Forecasting of Nonlinear Time Series Systems*

National Science Foundation: July 1994 - January 1996

Bonnie Ray

16. *Dynamics of Multi-fluid Flows and Interfaces*

National Science Foundation: June 1994 - June 1996

Demetrios Papageorgiou

17. *Mathematical Problems in Modern Electromagnetics*

Air Force Office of Scientific Research: July 1994 - June 1997

Gregory A. Kriegsmann

Cheryl Hile

Jonathan Luke

18. *Microwave Processing of Ceramic Materials*

National Science Foundation: July 1993 - January 1996

Gregory A. Kriegsmann

Barbara Wagner

**D. NON-CAMS FUNDED PROJECTS WITH CAMS PARTICIPATION**

1. *Coherent Structures and Chaos in a Turbulent Rotating Disk Flows*



N.A.T.O. International Exchange Programmes: 1994 - Present

Nadine Aubry

*2. Direct Simulation and Scaling Theory of Inhomogeneous Transitional and Turbulent Flows*

Cornell Theory Center: July 1996 - June 1997

Nadine Aubry

*3. Particle Processing Research*

NJCST New Jersey Commission on Science Technology

Denis Blackmore Department of Mathematics

Rajesh Dave Department of Mechanical Engineering

Anthony Rosato Department of Mechanical Engineering

Pushtendra Singh Department of Mechanical Engineering

*4. Incineration of Plastics and Cellulose in the Presence of Chlorine Species*

Proctor and Gamble Company: June 1994 - June 1997

Joseph Bozzelli Department of Chemical Engineering and Environmental Science

Michael Booty Department of Mathematics

*5. Plastics Combustion Data*

American Plastics Council: June 1996 - June 1999

Richard Magee Department of Chemical Engineering and Environmental Science

Joseph Bozzelli Department of Chemical Engineering and Environmental Science

Michael Booty Department of Mathematics

*6. Four-dimensional Conformal Structures and their Applications to General Relativity*

Catholic University of Leuven, Belgium: May 1997 - August 1997

V.V. Goldberg

*7. Particulate Technology in Manufacturing Processes*

National Science Foundation: June 1994 - December 1996

Robert Pfeffer Department of Chemical Engineering

Rajesh Dave Department of Mechanical Engineering

Ian Fischer Department of Mechanical Engineering

Anthony Rosato Department of Mechanical Engineering

Jonathan Luke Department of Mathematics

*8. Mathematical Aspects of Hypersonic Boundary Layers and Jets*

Air Force Office of Scientific Research: April 1994 - April 1997

Demetrios Papageorgiou (through CCNY)

*9. Controlling the Mobility of a Fluid Particle in Space by Remobilizing Surfactants*

N.A.S.A. Microgravity Research Initiative: August 1994 - April 1997

Demetrios Papageorgiou (through CCNY)

10. *Aging and Stiffness in Cardiovascular Functions*

UMDNJ-School of Osteopathic Medicine: December 1996 - December 1998

Hans Chaudhry (through Dr. Findley, Neuromusculoskeletal Institute)

## VII. PROPOSED RESEARCH

1. *Mathematical Sciences: Computing Research Environments*

National Science Foundation (SCREMS)

Daljit S. Ahluwalia - PI

Nadine Aubry

Victoria Booth

Michael Siegel

Burt Tilley

2. *Combined Symmetries and Exact Solutions of Multidimensional Wave*

US Civilian Research & Development FDN (Industry Outreach)

Roman Andrushiw

3. *A Dendritic Origin of Bistability of Mononeuron Firing Patterns*

National Science Foundation

Victoria Booth

*4. A Dendritic Origin of Motoneuron Bistability*

National Insitute of Health

Victoria Booth

*5. Modulation and Stability of Flame Structures*

National Science Foundation

Michael Booty

*6. A Student Designed Experiment to Analyze Particulate Collected During a NASA-Originated*

*Stratospheric Balloon Flight*

National Aeronautics and Space Administration

Bruce Bukiet

*7. Computational Electromagnetic Methods in Nonlinear Optics and Microwave Material Processing*

National Science Foundation

Cheryl Hile

*8. Applied Mathematical Problems in Microwave Processing of Ceramic Materials*

Department of Energy

Gregory A. Kriegsmann

9. *Microwave of Processing of Ceramic Materials*

National Science Foundation: Supplemental funding for Postdoctoral Fellow

Gregory A. Kriegsmann

10. *Microwave Processing of Ceramic Materials*

National Science Foundation: Research Experience for Undergraduate Program

Gregory A. Kriegsmann

11. *Motion Analysis Performance System*

St. Joseph Hospital Medical Center

Michael Lacker

12. *Array & Statistical Signal Processing for Marine Mammal Localization Classification and Channel Deconvolution*

National Science Foundation

Zoi Heleni Michalopoulou

13. *Ocean Acoustics and Signal Processing*

Office of Naval Research: (Young Investigator Program)

Zoi Heleni Michalopoulou

14. *Approximation and Parameter Continuation Method in Nonlinear Analysis*

National Science Foundation

Petronije Milojevic

15. *Surface Tension Driven Flows*

National Science Foundation

Demetrios Papageorgiou

16. *Adsorption of Surfactant onto the Interface of Sprayed Drops for Improved Agrochemical*

*Delivery: A Industry Based Graduate Research Assistantship*

National Science Foundation

Demetrios Papageorgiou

17. *Geoacoustic Parameter Estimation for the INTIMATE 96 Experiment*

Centre Militaire d'Océanographic, France

Michael Porter

18. *Broadband Inversion in Shallow Water*

Office of Naval Research

Michael Porter

19. *Surfactant Effects in Viscous Fingering*

National Science Foundation

Michael Siegel

19. *Pattern Formation in Multi-fluid Applications*

National Science Foundation

Burt Tilley

## VIII. FACILITIES

### A. CAMS/MATH COMPUTATION LABORATORY

#### Committee on Computation

Zoi-Heleni Michalopoulou, Chairperson

Bonnie Ray

#### Systems Administrator

Evangelos Tsimis

In the past year the CAMS computer laboratory expanded substantially with the addition of three Silicon Graphics Impact workstations purchased with NSF funds. The workstations, with a RAM of 128 Mbytes each, R10000 processors and integrated video capability, have significantly increased the computational power available to CAMS researchers. Furthermore, two Silicon Graphics workstations and a powerful pentium PC were acquired for new faculty.

In addition to the CAMS computer laboratory, which has mainly a research scope, a second computer laboratory was set up this year. The new laboratory (supported by the NSF ILI grant) consists of Silicon Graphics workstations and equipment for physical experiments, which are used by undergraduate students for projects on applied mathematics and statistics within a capstone course.

A computer policy was also established that regulates the operation of the CAMS computer laboratory for a more secure and efficient use of the available resources. The computer policy was distributed to faculty and graduate students and is also posted on the CAMS [www.site](http://www.math.njit.edu). The same site contains a brief description of the hardware and software available in the laboratory, with the scope of informing CAMS members of the current resources and helping them identify needs for additions and improvements.

Moreover, the upgrade of the computer laboratory networking and back-up facilities was researched by the systems administrator and the computer committee. Backing-up the hard disks will now be performed by a new 8 mm back-up device with higher capacity than our original device. Regarding networking, solutions for improvement have been proposed and a plan for extension of our current network for better efficiency and higher speed is currently under construction.



## **B. CAMS Reading Room**

### **Committee on Research Facilities:**

Manish Bhattacharjee, Chairperson

Victoria Booth

The CAMS Reading Room, located in Cullimore 607, is a depository for research monographs and relevant books/journals. It also houses preprints, research articles and reprints of articles published by CAMS members. New books and software manuals are added to the collection as funds permit. Books/monographs authored/edited by CAMS faculty members are often donated to the Reading Room. Professor Goldberg dedicated his book, *Conformal Differential Geometry and its Generalizations* (with M.A. Akivis) to the CAMS library. Informal exchange of research ideas and discussions are facilitated by periodic CAMS teas/meetings.

The world wide web site at <http://chaos.njit.edu/cams/cams.htm> provides more information about the CAMS Reading Room.

## **IX. PUBLICATIONS, PRESENTATIONS AND CAMS REPORTS**

### **A. PUBLICATIONS**

#### **Roman Andruskiw**

*Nonlinear Algorithm of Pattern Recognition for Computer-aided Diagnosis of Breast Cancer*, (with Y.I. Petunin, D.A. Kljushin), Proceedings of the Second World Congress of Nonlinear Analysis, V. Lakshmikantham, ed, Elsevier Science Publishers, Vol. 30, pp 432-441, 1996.

#### **Nadine Aubry**

*Space-time Description of the Splitting and Coalescence of Wave Fronts in Falling Film Flows*, (with F. Carbone, J. Liu, J.P. Gollub, and R. Lima), *PhysicaD*, Vol. 96, pp 182-199, 1996.

*Hierarchical Order in Wall-bounded Shear Turbulence*, (with F. Carbone), *Physics and Fluids*, Vol. 8(4), pp 1061-1075, 1996.

*Stability of Pole Solutions for Planar Propagating Flames*, (with M. Rahibe and G.I. Sivashinsky), *Physical Review E* Vol. 54, pp 4958-4972, 1996.

*Criteria for Transition to Turbulence Induced by Rychmyer-Meshkov and Rayleigh-Taylor Instabilities*, (with Z. Zhao and M. Legrand), *Compressible Turbulent Mixing*, eds. R. Young, J. Glimm and B. Boston, World Scientific, 1996.

*Transition to Turbulence Generated by Interface Instabilities During a Cylindrical Implosion,*

(with M. Legrand, M. LePiouffle, and A. Dewisme), *Compressible Turbulent Mixing*, eds. R. Young, J. Glimm, and B. Boston, World Scientific, 1996.

### **John Bechtold**

*Response of Premixed Counterflow Flames to Oscillating Strain Rates*, (with H.G. Im, and C.K. Law), *Combustion Flame*, Vol. 105, pp 358-372, 1996.

*Microwave-assisted Ignition*, (with G.A. Kriegsmann, and M.R. Booty), *Material Research Society Symposium Proceedings*, Vol. 430, pp 369-375, 1996.

### **Manish C. Bhattacharjee**

*Stochastic Comparisons and Bounds for Aging Renewal Process Shock Models and Their Applications*, *Ann. Inst. Statist. Mathe.*, Vol. 48, No. 6 pp 645-662, 1996

*Probability and its Applications: Selected Papers*, M.C. Bhattacharjee and S.K. Basu eds., ISBN# 019563941-3, Oxford University Press, 1997.

### **Denis Blackmore**

*Integrable Discrete Dynamics and Fibonacci Sequences*, (with J. Kappraff), *ZAMM*, SI 2, pp 49-52, 1996.

*A General Fractal Distribution Function for Rough Surface Profiles*, (with G. Zhou), *SIAM Journal on Applied Mathematics*, Vol. 56, pp 1694-1719, 1996.

*Determination of Flat-end Cutter Orientation in 5 Axis Machining*, (with Z. Deng, M.C. Leu),

Proceeding ASME Symposium on Rapid Response Manufacturing, pp 73-80, 1996.

*Application of the SDE to 5-Axis Sculptured Surface Machining*, (with Z. Deng, M.C. Leu),

Proceedings 3rd International Conference on Automation Technology, pp 104-112, 1996

*Large Lax-type Flows on Grassmann Manifolds*, (with A. Prykarpatsky, J. Azgradzi),

Proceedings Symposium Mathematical Physics A9 (5), pp 226-237, 1996.

*Swept Volume: A Retrospective and Prospective View*, (with M.C. Leu, L.P. Wang, and H. Jiang), *Neural*,

Parallel & Scientific Computations, Vol 5, pp 81-102, 1997.

*Chaos in One-dimensional Granular Flows with Oscillating Boundaries*, (with R. Dave), Powders and Grains 97, R. Behringer and J. Jenkins eds., Balkema, Rotterdam, pp 409-412, 1997

*Kinematics Analysis of a 5-axis Milling Machine and its Application to NC Verification*, (with L. Wang, and M. C. Leu), Proceeding International Conference on Manufacturing Automation, Hong Kong, 1997.

*Swept Volume Approach as an Integral Part of 5-axis NC Milling CAD/CAM Systems*, (with L. Wang and M.C. Leu), Proceeding International Conference on Manufacturing Automation, Hong Kong, 1997.

*Generating Swept Solids for NC Verification using the SEDE Method*, (with L. Wang and M.C. Leu), Proceeding Fourth ACM Symposium on Solid Modeling Applications, Atlanta, 1997.

*A New Fractal Model for Anisotropic Surfaces*, (with G. Zhou), Proceeding 7th International Conference on Metrology and Properties of Engineering Surfaces, pp 147-153, 1997.

*Applications and Generalizations of the SDE Method*, Proceeding NSF Design and Manufacturing Grantees Conference, pp 101-102, 1997.

### **Michael Booty**

*Time-dependent Premixed Deflagrations*, AIAA Technical Paper 96-0910, 1996

*Microwave-Assisted Ignition*, (with J.K. Bechtold and G.A. Kriegsmann), Materials Research

Society Symposium Proceedings, Vol 430, pp 369-375, 1996.

*Shock-wave Interaction with a Fast Convection-reaction Driven Flame*, (with R.G. Johnson, A.C.

McIntosh and J. Brindley and M. Short), Proceedings of the 26th International Symposium on Combustion, pp 891-898, 1996.

### **Amit Bose**

*Functional Reorganization in Thalamocortical Networks: Transition Between Spindling and*

*Delta Sleep Rhythms*, (with D. Terman, and N. Kopell), Proceedings of the National Academy

of Sciences, Vol. 93 No. 26 pp 15417-15422, 1996.

### **Bruce Bukiet**

*A Markov Chain Approach to Baseball*, (with E. Harold and J. Palacios), Operations Research,

Vol. 45, No. 1, pp 14-23, 1997.

*Stresses and Strains in the Passive Left Ventricle*, (with H.R. Chaudhry, and T. Findley), Journal of Biological Systems, Vol. 4, No. 4, pp 534-554, 1996.

*Stresses and Strains in the Left Ventricular Wall Approximated as a Thick Conical Shell Using Large Deformation Theory*, (with H.R. Chaudhry and A.M. Davis), Journal of Biological Systems, Vol. 4, No. 3, pp 353-372, 1996

*Residual Stresses in Oscillating Thoracic Arteries Reduce Circumferential Stresses and Stress Gradients*, (with H. R. Chaudhry, A. Davis, A.B. Ritter, and T. Findley), International Journal of Nonlinear Mechanics, Vol. 30, No. 1, pp 57-62, 1997.

*Dynamic Stresses and Strains in the Left Ventricular Wall based on Large Deformation Theory*, (with H.R. Chaudhry, and T. Regan), Journal of Nonlinear Mechanics, Vol. 32, No. 3, pp 621-631, 1997

### **Hans R. Chaudhry**

*Stresses and Strains in the Left Ventricular Wall Approximated as a Thick Conical Shell Using*

*Large Deformation Theory*, (with B Bukiet, A.M. Davis, and T. Findley), Journal of Biological

Systems, Vol. 4, No. 3, , pp 353-372, 1996.

*The Effect of Residual Stresses on Wave Speed in Arteries*, (with B. Bukiet and M. Lacker), Journal of Biological Systems, Vol. 4, No. 2, pp 171-180, 1996.

*Stresses and Strains in the Passive Left Ventricular*, (B. Bukiet, T. Findley, and A.B. Ritter), Journal of Biological Systems, Vol. 4, No. 4, pp 535-554, 1996.

*Comments on "Passive Material Properties of Intact Ventricular Myocardium Determined from a Cylindrical Model*, Journal of Biomechanical Engineering, Vol. 18, pp 262-263, 1996.

*Comments on "A Conical Model for the Left Venricular Twisting Motion"*, Annals of Biomedical

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*Residual Stresses in Oscillating Thoracic Arteries Reduce Circumferential Stresses and Stress Gradients*,

(with B. Bukiet, A. Davis, A.B. Ritter, and T. Findley), Journal of Biomechanics, Vol. 30, No. 1, pp 57-62, 1997.

*Dynamic Stresses and Strains in the Left Ventricular Wall Based on Large Deformation Theory*, International Journal Nonlinear Mechanics, Vol. 32, No. 3, pp 621-631, 1997.

### **Nuno Crato**

*On the Power of Underdifferencing and Overdifferencing Tests Against Nearly Nonstationary Alternatives*, (with Pedro de Lima), Communications in Statistics, Vol. 26, No. 4, 1997.

### **Sunil Dhar**

*Models of Order K*, Journal Applied Statistical Science, Vol. 3, No. 1, p 65-74, 1996.

*Probability Bounds on the Finite Sum of the Binary Sequence of Order K*, Abstract published, Session #214, p 213, 1996.

### **Rose Dios**

*Contributions to Balanced Arrays Using Kurtosis and Skewness*, (with D. Chopra), Journal of Combinatorial Mathematics and Combinatorial Computing, Vol. 12, pp 207-215, 1996.

*Optical Signature Utilization of Remote Sensing of Nearshore Waters*, (with S. Bagheri, Smith, Fetlin and Pan), Proceeding Fourth International Conference on Remote Sensing for Marine and Coastal Environments, Florida, 1997.

*On Two Levels Balanced Arrays of Strength Six*, (with D.V. Chopra), The Journal of Combinatorial Mathematics and Combinatorial Computing, Vol. 24, pp 249-253, 1997.

### **Thomas Erneux**

*Strongly Pulsating Lasers with Delay*, (with D. Pieroux), Physical Review, A 53, pp 2765-2771, 1996.

*Mechanisms for Period Doubling Bifurcation in a Semiconductor Laser Subject to Optical Injection*, (with V. Kovanis A. Gavrielides, and P.M. Alsing), Physical Review A 53, pp 4372-4380, 1996.

*Lang and Kobayashi Phase Equation*, (with P.M. Alsing, V. Kovanis, and A. Gavrielides), Physical Review A. 53, pp 4429-4434, 1996.

*Mathematical Studies of Coupled Lasers*, in Laser Optics, "95": Nonlinear Dynamics in Lasers,

(with R. Kuske and T.W. Carr) Proceedings SPIE eds. N.B. Abraham and Y.I. Khanin, pp 54-64,

1996.

*Subharmonic Resonances in an Optically Injected Semiconductor Laser* (with A. Gavrielides, V. Kovanis, P. Varangis, and T.B. Simpson), Physics and Simulations of Optoelectronic Devices IV, Proceedings SPIE 2693, W.W. Chow, and M. Osinski, Eds. pp 654-665, 1996.

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*Pump Modulation of a Two-mode Fabry-Perot Laser: Influence of an Internal Resonance*, (D. Pieroux and P. Mandel), Physical Review, A 54, pp 3409-3419, 1996.

*Bifurcation to Localized Oscillations*, (with R. Kuske), European Journal on Applied Mathematics, 1997.

*Stability Boundaries for a Semiconductor Laser Subject to Optical Injection*, (with A. Gavrielides and V. Kovanis), Optics Communications, 1997.

*Amplitude Instability of Coupled Lasers* (with K.S. Thornburg, Jr., M. Muller, R. Roy, T.W. Carr and R.D. Li), Physical Review E

*Near Threshold Bursting is Delayed by a Slow Passage Near a Limit Point*, (with V. Booth and T.W. Carr), SIAM Journal of Applied Mathematics, 1997.

*The Low Pump Limit of the Bifurcation to Relaxation Oscillations in a Semiconductor Laser Subject to External Optical Feedback*, (with G. Lythe, A. Gavrielides and V. Kovanis), Physical Review.

## **Vladislav Goldberg**

*Conformal Geometry and its Generalizations* (with M.A. Akiwis), Pure and Applied Mathematics, A Wiley Interscience Series of Texts, Monographs, and Tracts, John Wiley & Sons, xiii+386, 1996.

*A New Conformal Differential Invariant and the Conformal Rigidity of Hypersurfaces*, (with M.A. Akiwis), Abstract of Papers Presented to the American Mathematical Society, Vol 17, No. 3, p 596, 1996.

*A New Conformal Differential Invariant and the Conformal Rigidity of Hypersurfaces*, (with M.A. Akiwis), Proceedings American Mathematical Society, Vo. 125, No. 8, pp 2415-2424, 1997.

*On the Theory of Almost Grassmann Structures*, Proceedings of the International Conference on Differential Geometry (Eotvos University, Budapest), Kluwer Academic Publishers, 1997.

### **Cheryl Hile**

*Numerical Solutions of Maxwell's Equations for Nonlinear Optical Pulse Propagation*, (with W.L. Kath), Journal of the Optical Society of America B, Vol. 13, (6), 1996.

*Comparisons Between Numerical Solutions of Maxwell's Equations and an Extended Nonlinear Schrodinger Equation*, Wave Motion, Vol. 24, No. 24, pp 1-12, 1996.

*A Hybrid Numerical Method for Modeling Microwave Sintering Experiments*, (with G.A. Kriegsmann),

Microwave Processing of Materials V, Vol. 430, pp 319-324, 1996.

### **Gregory A. Kriegsmann**

*Scattering by Large Structures with Periodic Surfaces: A Prototype Problem*, (with C.L. Scandrett),

Journal of the Society for Applied Computational Electromagnetics, Vol. 11, No. 1, pp 57-62, 1996.

*Cavity Effects in Microwave Heating of Ceramics*, SIAM Journal of Applied Mathematics, Vol. 57, No. 2, 1996.

*Scattering by a Rectangularly Corrugated Surface: An Approximate Theory*, (with B.J. McCartin), IEEE Journal on Antennas and Propagation, Vol. 44, No. 8, pp 1193-1194, 1996.

*The Galerkin Approximation of the Iris Problem: Conservation of Power*, Applied Mathematics Letters, Vol. 10, No. 1, pp 41-44, 1997.

*Cavity Effects and Hot Spot Formation in Microwave Heated Ceramic Fibers*, Microwave Heating of Ceramic Materials V, Vol. 430, pp 181-186, 1996.

*A Hybrid Numerical Method for Modeling Microwave Heating in Single Mode Cavities*, (with C.V. Hile), Microwave Heating of Materials V, Vol. 430, pp 319-324, 1996.

*Microwave Heating of Ceramic Laminates*, (with J.A. Pelesko), Microwave Heating of Materials V, Vol. 430, pp 187-192, 1996.

*Microwave Assisted Ignition*, (with J.K. Bechtold and M.R. Booty), Microwave Heating of Materials V, Vol 430, pp 369-375, 1996.

### **Z. H. Michalopoulou**

*Bayesian Modeling of Acoustic Signals for Seafloor Identification*, (with D. Alexandrou), Journal of the Acoustical Society of America, Vol. 99, pp 223-233, 1996.

*Matched Field Processing for Broadband source Localization*, (with M.B. Porter), IEEE Journal of Oceanic Engineering, Vol. 21, No. 4, pp 384-392, October 1996.

*Determining Neutralization Serotypes of HIV-1 by Neural Networks*, (with L. Kostrikis, Y. Cao, J.P. Moore, and D. Ho), Journal of AIDS Research and Human Retroviruses, Vol. 12, No. 18, pp 1667-1669, December 1996.

*Broadband Source Localization in the Gulf of Mexico*, (with M.B. Porter, J.P. Ianniello), Journal of Computational Acoustics, Vol. 4, No. 4 pp 361-370, December 1996.

*Source Tracking in the Hudson Canyon Experiment*, (with M.B. Porter), Journal of Computational Acoustics, Vol. 4, No. 4, pp 371-383, December 1996.

*Biological Transient Signal Processing: Marine Mammal Identification, Localization, and Source Signal Deconvolution*, Proceedings of ICASSP-97, Germany, Vol. 1, pp 503-506, 1997.

### **Petronije Milojevic**

*Approximation Solvability of Hammerstein Equations*, Publications de L'Institute Mathematics, Vo.1 58 (72), pp 71-84, 1995.

*Approximation Solvability of Semilinear Equations and Applications in Theory and Applications of Nonlinear Operators of Accretive and Monotone Type*, Leehive Notes in Pure and Applied Mathematics, Vol. 178, Marcel Dekker, NY, pp 149-208, 1996.

*Solvability of Semilinear Operator Equations and Periodic Solutions of Differential Equations*, World Congress of Nonlinear Analysts '92, pp 125-135, 1996.

*Implicit Function Theorems, Approximation Solvability of Nonlinear Equations, and Error Estimates*,

Journal Mathematical Analysis and Applications, 211 pp. 424-459, 1997.

### **Demetrios Papageorgiou**

*Temporal and Spatial Instability of an Inviscid Compound Jet*, (with A. Chauhan, C. Maldarelli, and

D.S. Rumchitzky), Rheologica Acta, Vol. 35, No., 6 pp 567-583, 1996.

*Computer Assisted Study of Strange Attractors of the Kuramoto-Sivashinsky Equation*, (with Y.S. Smyrlis), Zietschrift fur Angewandte Mathematic und Mechanik (ZAMM), Vol. 76, No. S2, pp 57-60, 1996.



*Description of Jet Breakup. Advances in Multi-fluid Flows*, SIAM Proceedings Series, pp 171-198, 1996.

*Computational Study of the Kuramoto-Sivashinsky Equation*, Advances in Multi-fluid Flows, SIAM Proceedings Series, pp 426-432, 1996.

*Nonlinear Evolution Equations for Coaxial Jet Breakup*, Proceedings of the Symposium on Rheology and Computational Fluid Mechanics, Editor G. Georgiou, 1996.

### **Michael Porter**

*A Coherent Approach to Broadband Matched-field Processing: Application in the Hudson Canyon*, (with Z.H. Michalopoulou), International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

Proceedings, Vol. 2, p 1189, 1996.

*Focalization in the Gulf of Mexico*, (with Z.H. Michalopoulou), International Conference on Acoustics, Speech, and Signal Processing (ICASSP) Proceedings, Vol. 6, p 3086, 1996.

*Environmentally Adaptive Robust Processing of Sea Test Data*, (with Z.H. Michalopoulou), Proceedings of the Technical Workshop on Undersea Warfare Superiority. Ed John Short, NUWC TR-xxxx.

*Simulated Annealing and Genetic Algorithms for Broadband Source Focalization*, (with Z.H. Michalopoulou, and H. Martynov), Proceedings of the Third European Conference on Underwater Acoustics, Crete, Greece, Ed. J. Papadakis, 1996.

*Active Matched-field Processing*, (with Z.H. Michalopoulou), Proceedings of the 8th Matched-field Processing Workshop, p 3-28, NRaD Technical Document 2932, 1996.

*Matched-Field Processing for Broadband Source Localization*, (with Z.H. Michalopoulou), IEEE Journal of Oceanic Engineering, Vol. OE-21(4) p 384-392, 1996.

*Source Tracking in the Hudson Canyon*, (with Z.H. Michalopoulou), Journal of Computational Acoustics,

Vol. 4(4), p 371-383, 1996.

*Broadband Source Localization in the Gulf of Mexico*, (with Z.H. Michalopoulou), Journal of Computational Acoustics, Vol. 2(3), p 361-370, 1996.

*Modeling Sound Propagation in the Ocean*, Computational Wave Propagation, IMA Vol. 86, p 197-215.

eds. Bjorn Engquist and Gregory A. Kriegsmann, Springer-Verlag, 1997.

*Internal Tide Impact Measured by Acoustic Tomography Experiment*, (with Y. Stephan, X. Demoulin,

S. Jesus, and E.F. Coelho), *Journal Acoustical Society of America*, Vol. 99(5), Pt.2, 1996.

*Performance Evaluation of Replica-based and Standard Matched-filters*, (with Z.H. Michalopoulou, and S. Stergiopoulos), *Journal Acoustical Society of America*, Vol. 99(5), Pt. 2, 1996.

*INTIMATE '96: Shallow Water Tomography in the Sea of the Condemned*, *Journal Acoustical Society of America*, (with E.f. Coelho, S. Jesus, Y. Stephan, and X. Demoulin), Vol. 101(5), Pt. 2, 1997.

### **Bonnie Ray**

*Foundations of the Theory of Evidence: Resolving Conflict Among Schemata*, (with D. Krantz), *Theory and Decision*, Vol. 40(3), pp 215-234, 1996.

*Model Selection and Forecasting for Long-Range Dependent Processes*, (with N. Crato), *Journal of Forecasting*, Vol. 15(2), p 107-125, 1996.

*Interactive Bandwidth Estimation for Processes with Long-Range Dependent Errors*, (with R. Tsay), *Proceedings of the International Conference on Applied Probability and Time Series*, Vol. 2, eds. P.M. Robinson and M. Rosenblatt, Springer-Verlag, pp 339-351, 1996.

*Some Problems in the Overspecification of ARMA and ARIMA Processes Using ARFIMA Models*, *Proceedings of the Third Congress of the Portuguese Statistical Society*, ed.J. Branco, P. Gomes, and J. Prato, Salamandra, Lisbon, p 527-539, 1996.

*Estimation Methods for Multivariate ARMA and ARFIMA Processes*, (with N. Ravishanker), in *Final Program of Sydney International Statistical Conference*, Sydney, AU, July, 1996.

*Data-Driven Methods for Nonlinear Time Series Analysis: Multivariate Adaptive Regression Splines (MARS) and Transform-Expand-Select (TES)* in *Final Program of the International Conference on Financial Engineering*, New York, NY, March 1996.

### **Michael Siegel**

*Singular perturbation of smoothly evolving Hele-Shaw Solutions*, *Physical Review Letters*, Vol. 76, p 419, 1996.

*Singular Effects of Surface Tension in Evolving Hele-Shaw Flows*, (with S. Tanveer and S. Dai),

*Journal of Fluid Mechanics*, Vo. 323, p. 201, 1996.

### **Burt Tilley**

*Shear and Interfacial Instabilities of Oil-Water Flow in an Inclined Channel*, (with S.G. Bankoff

and S.H. Davis), *Chemical Engineering Comm.*, Vol. 141, pp 41-49, 1996.

*On Long-Wave Dynamics in Countercurrent Flows: Advances in Multi-Fluid Flows*, Proceedings of the AMS-INS-SIAM Joint Summer Research Conference on Multi-Fluid Flows and Interfacial Instabilities, eds. Y.Y. Renardy, A.V. Coward, D.T. Papageorgiou, 1996.

## **B. PRESENTATIONS**

### **Roman Andruskiw**

July 1996: Second World Congress of Nonlinear Analysis, International Federation of Nonlinear Analysis, Athens, Greece

*Nonlinear Algorithm of Pattern Recognition for Computer aided Diagnosis of Breast Cancer*

### **Nadine Aubry**

January 1996: Instituto Superior Tecnico, Lisboa, Portugal

*On the Formation of Spilling Breaking Waves*

February 1996: Center for Applied Mathematics and Statistics, NJ Institute of Technology, NJ

*Scaling Theory of Inhomogeneous Turbulence: Application to Wall Bounded Flows*

July 1996: ERCOFTAC Summerschool on Turbulence Modeling and the Theory of Hydrodynamic Instabilities: Exploring Possible Points of Contact, EPFL, Lausanne

*Dynamical Systems Consisting of a Small Number of Modes*

September 1996: New Jersey Institute of Technology, Newark, NJ

*Numerical Simulation, Modeling and Control of Wake Flows Past a Circular Cylinder*

November 1996: New Jersey Institute of Technology, Newark, NJ

*Balancing the Personal and the Professional*

November, 1996: 49th Annual Meeting, Division of Fluid Dynamics of the American Physical Society, Syracuse, NY

1. *Symmetry Breakdown to Three-dimensional Flow in a Cylindrical Tank with a Rotating Lid*
2. *Direct Numerical Simulation of Wake-flows Around an Impulsively Started Cylinder*
3. *Numerical Simulation for Turbulent Channel Flow Based on POD Modes*
4. *Stability of Pole Solutions for Planar Propagating Flames*

December 1996: IRPHEE, Marseilles, France

*Hierarchical Order in Wall Bounded Turbulence*

February 1997: ONR Workshop on Free-surface and Wall-bounded Turbulence and Turbulent Flows,

California Institute of Technology, Pasadena, CA

*Space-time Structure of Breaking Spilling Waves*

March 1997: March Meeting of the American Physical Society

1. *Pattern Formation and Three-dimensional Instability in Rotating Flows*
2. *Control of the Symmetry Breaking Instability in a Wake Flow Past an Impulsively Started Cylinder*

May 1997: Fourth SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah

*Space-time Modeling and Pattern Formation in Rotating Flows*

June 1997: 16th Canadian Congress of Applied Mechanics, Laval University, Quebec CANADA

*Generation of Optimal Modes in a Turbulent Channel Flow in Sturm-Liouville Systems*

## **John Bechtold**

April 1996: MRS 1996 Spring Meeting, San Francisco, CA

*Microwave-assisted Ignition*

July 1996: SIAM Annual Meeting, Kansas City, MO

*Weakly-strained Flames in Oscillating*

July 1996: Poster: Twentysixth International Symposium on Combustion, Naples, Italy

*Microwave-induced Ignition of a Combustible Solid*

January 1997: Poster: First World Congress on Microwave Processing, Orlando, FL

1. *Microwave-induced Ignition of a Combustible Solid*

2. *Microwave-assisted Combustion*

**Denis Blackmore**

March 1996: New Graduate Course on Frontiers of Particle Technology, NJIT, Newark, NJ

*Mathematical Models for Granular Flows*

May 1996: Biological Sciences Workshop, Saratoga, NY

*New Dynamical Systems Models for Plant Growth Phenomena*

January 1997: NSF Design and Manufacturing Grantees Conference, Seattle, WA

*Generalizations and Applications of the SDE Method*

May 1997: International Conference of Metrology and Engineering Surface, Gottenburg, Sweden

*A New Fractal Model for Anisotropic Surfaces*

June 1997: Powders and Grains Conference, North Carolina

*Chaotic Particle Flows*

**Victoria Booth**

November 1996: Society for Neuroscience 26th Annual Meeting, Washington, DC

*A Compartmental Model of Bistable and Complex Firing Patterns of Vertebrate Motoneurons*

January 1997: Joint Mathematics Meetings, San Diego, CA

*Delayed Activation of Plateau Potentials in Bistable Motoneurons*

February 1997: Program in Applied and Computational Mathematics, Princeton University, Princeton, NJ

*Modeling Bistability of Motoneuron Firing Patterns*

**Michael Booty**

January 1996: AIAA 34th Annual Meeting, Reno, Nevada

*Time-dependent Premixed Deflagrations*

March 1996: SIAM Sixth International Conference on Numerical Combustion, New Orleans, LA

*Time-dependent Premixed Deflagrations*

April 1996: Materials Research Society Symposium, San Francisco, CA

*Microwave-assisted Ignition*

July 1996: Poster Presentations at the 26th International Symposium on Combustion, Naples, Italy

1. *Time-dependent premixed Deflagrations*

2. *Pyrolysis and Oxidation of Cellulose-An Experimental Study of Reaction Products*

3. *A Pilot-scale Incinerator for Evaluating the Combustion of Plastics*

January 1997: Poster Presentation Material Research Society Symposium, Orlando, FL

1. *Microwave-induced Ignition*

2. *Microwave-assisted Combustion*

**Amit Bose**

May 1996: International Conference on Dynamical Systems and Differential Equations Southwest Missouri State University, Springfield, MO

*The Global Dynamics of Two Mutually Coupled Inhibitory Neurons*

February 1997: Applied Mathematics Colloquium, Columbia University, New York, NY

*Applications of Dynamical Systems to Neural Networks*

May 1997: Fourth Annual SIAM Conference on Dynamical Systems, Snowbird, UT

*Dynamics of Two Mutually Coupled Slow Inhibitory Neurons*

**Bruce Bukiet**

April 1996: National Center for Medical Rehabilitation Research Trainee Conference, National Institute of Health, Bethesda, MD

*Mathematical Modeling of Blood Flow in Arteries and Transmural Stresses and Strains in the Heart Muscle*

August 1996: XIXth International Congress of Theoretical and Applied Mechanics, Kyoto, Japan

*Stress Analysis in the Passive Myocardium*

September 1996: Explosive Technology Granch Seminar, Army Research Laboratory, Aberdeen Proving Ground, Aberdeen, MD

*Pop Plots, Curvature and the Diameter Effect in Solid Explosives*

November 1996: APS Division of Fluid Dynamics Meeting, Syracuse, NY

*Pop Plots, Curvature and the Diameter Effect in Solid Explosives*

**Hans Chaudhry**

April 1996: Annual Meeting of National Center of Medical Rehabilitation and Research, National Institute of Health, Bethesda, MD

*Mathematical Modeling of Wave Speed in Arteries and Transmural Stress Distribution in the Left Ventricle*

August 1996: XIXth International Conference of Theoretical and Applied Mathematics, Kyoto, Japan

*Stresses and Strains in the Passive Myocardium*

February 1997: Poster Presentation Research Day of University of Medicine and Dentistry, School of Osteopathic Medicine, Stratford, NJ

*Mathematical Modeling of Wound Closure Stresses*

March 1997: Department of Mathematics & Statistics, NJIT, Newark, NJ

*Mathematical Modeling of Stresses and Displacements Resulting from Suturing Wounds*

### **Nuno Crato**

March, 1997: Bell Laboratory-Lucent, Murray Hill, NJ

*Modeling Persistence in Stochastic Volatility*

March, 1997: IEEE/IAFE CIFEr Conference, New York, NY

*Models for Stochastic Volatility: Some New Developments*

May, 1997: 5th CEMAPRE Conference, Lisbon

*Non-Gaussian Stable CostDistributions of Search Algorithms*

June, 1997: International Symposium on Forecasting, Barbados

*Unit Root Testing and forecasting*

### **Sunil Dhar**

August 1996: Joint Statistical Meetings, ASA, 156th Annual Meeting, Chicago, IL

*Probability Bounds on the Finite Sum of the Binary Sequence of Order  $K$*

March 1997: Franklin High School, Department of Mathematics, New Brunswick, NJ

*Statistical Models*

### **Rose Dios**

November 1996: Midwest Conference on Combinatorics, Cryptography and Computing, Las Vegas, Nevada

*On the Number of Constraints of Certain Combinatorial Arrays*



March 1997: International Conference on Remote Sensing for Marine and Coastal Environments, Orlando, Florida

*Optical Signature Utilization of Remote Sensing of Nearshore Waters*

March 1997: Department of Mathematics, Wichita State University, Kansas

*Preoperative Risk Assessment for Cardiac Surgery*

## **Thomas Erneux**

January - February 1996: SPIE Conference on Physics and Simulation of Optoelectronic Devices IV,

San Jose, CA

1. *Subharmonic Resonances in an Optically Injected Semiconductor Laser*

2. *Lang and Kobayashi Phase Equation*

June 1996: Free University Amsterdam, The Netherlands

*Semiconductor Laser Instabilities and Bifurcations*

June 1996: Summer School on Nonlinear Optics, Dijon, France

Lectures

September 1996: EQEC'96, Hamburg, Germany

1. *Sow Passage Through Resonance in a Periodically Modulated Laser*

2. *Nonlinear Resonances in Optically Injected Semiconductor Lasers*

3. *Quasiperiodic Intensity Oscillations in a Laser Subject to Optical Feedback*

October 1996: Nonlinear Optics Workshop, Tucson, Arizona

1. *Dynamics of Mutually Coupled Semiconductor Lasers*

## *2. Cascading Bifurcations in Semiconductor Lasers Subject to Optical Feedback*

November 1996: IEEE-LEOS 9th Annual Meeting, Boston, MA

*Semiconductor Laser Bifurcations*

November 1996: Division of Applied Mathematics, Brown University, Providence, RI

*Semiconductor Laser Bifurcations*

December 1996: Free University Amsterdam, The Netherlands

*Semiconductor Laser Bifurcations*

February 1997: SPIE Conference on Physics and Simulation of Optoelectronic Devices V,

San Jose, CA

1. *Quasiperiodicity in Semiconductor Lasers*

2. *Dynamics of Two Coupled Non-identical Semiconductor Lasers*

## **Vladislav Goldberg**

May 1996: 4th International Congress of Geometry, Aristotle University, Thessaloniki, Greece

*On a Normalization of a Grassmann Manifold*

April -May 1996: Istanbul Technical University, Turkey

*Conformal Differential Geometry* - 8 hour course

May 1996: Uludag University, Bursa, Turkey

*Conformal Structures* - two 2 hour lectures

May 1996: Ankara University, Ankara, Turkey

*Almost Grassmann Structures*

May 1996: Middle East Technological University, Ankara, Turkey

*A Conformal Rigidity for Hypersurfaces of a Conformal Space*

May 1996: Bilkent University, Ankara, Turkey

*Web Geometry: Its Past, Present, and Future*

July 1996: International Conference on Differential Geometry, Eotvos University,

Budapest, Hungary

*Conformal and Grassmann Structures*

January 1997: Workshop on Differential Geometry and Dynamical Systems, Shin-Shu

University, Matsumoto, Japan

*Web Geometry, Its Past, Present and Future*

January 1997: Kobe University, Kobe, Japan

*Grassmann and Algebraic Webs*

January 1997: Shimane University, Matsue, Japan

*Webs and Quasigroups*

January 1997: Sapporo University, Sapporo, Japan

*Rank Problems for Webs*

**Cheryl Hile**

April 1996: Materials Research Society Meeting, San Francisco, CA

*A Hybrid Numerical Method for Modeling Microwave Sintering Experiments*

June 1996: Conference on Ordinary Differential Equations, Dundee, Scotland

*A Hybrid Numerical Method for Modeling Microwave Heating*

July 1996: SIAM Annual Meeting, Kansas City, MO

*A Hybrid Numerical Method for Modeling Microwave Heating*

October 1996: AFOSR Nonlinear Optics Workshop, Tuscon, AZ

*An Efficient Numerical Method for Solving Nonlinear Evolution Equations*

January 1997: First World Congress on Microwave Heating, Orlando, FL

*A Hybrid Numerical Method for Modeling Microwave Sintering Experiments*

February 1997: Northern Valley Regional High School, Demerest, NJ

*Applied Mathematical Modeling of Nonlinear Optics*

**Gregory A. Kriegsmann**

Apri 1996: Department of Mathematics, University of Delaware, Newark, DE

*Cavity Effects and Hot Spot Formation in Microwave Heated Ceramic Fibers*

May 1996: Material Research Society Meeting, San Francisco, CA

*Cavity Effects and Hot Spot Formations in Microwave Heated Ceramic Fibers*

July 1996: Society for Industrial and Applied Mathematics (SIAM), Kansas City, MO

*Scattering by Large Slowly Changing Cavities*

July 1996: Thirteenth Conference in Ordinary and Partial Differential Equations, University of Dundee, United Kingdom

*Cavity Effects and Hot Spot Formation in Microwave Heated Ceramic Fibers*

October 1996: Department of Mathematics, University of Notre Dame, Notre Dame, IN

*Cavity Effects and Hot Spot Formation in Microwave Heated Ceramic Fibers*

October 1996: University of Arizona, Tucson, Arizona

*Hot Spot Formation in Microwave Heated Ceramic Fibers*

November 1996: Department of Mechanical and Aerospace Engineering, Rutgers University,  
New Brunswick, NJ

*Scattering by Large Resonant Cavities*

January 1997: First World Congress on Microwave Processing, Orlando, FL

*Hot Spot Formation in Microwave Heated Ceramic Fibers*

March 1997: Department of Mathematics, The University of Mexico, Mexico City, Mexico

1. *Scattering by Large Resonant Cavities*

2. *Cavity Effects and Hot Spot Formation in Microwave Heated Ceramic Fibers*

3. *A Mathematical Theory of Rectification*

April 1997: DOE Contractors Meeting, Oakland CA

*Microwave Heating of Materials*

April 1997: Department of Mathematics, William Patterson College, Patterson, NJ

1. *Scattering by Large Resonant Cavities*

2. *Cavity Effects and Hot Spot Formation in Microwave Heated Ceramic Fibers*

3. *A Mathematical Theory of Rectification*

May 1997: SIAM Meeting on Mathematics of Material Sciences, Philadelphia, PA

*Hot Spot Formation in Microwave Heated Ceramic Fibers*

**Jonathan H.C. Luke**

January 1996: IMA Workshop on Particulate Flows: Processing and Rheology, Institute for Mathematics and its Applications, Minneapolis, MN

*On the Standard Model for Sedimentation*

February 1996: Applied Mathematics Seminar, University of Wisconsin, Madison, WI

*Deficiencies in the Mathematical Understanding of the Standard Model for Sedimenting Suspensions*

June 1996: CAMS Graduate Research Seminar, NJIT, Newark, NJ

*A Numerical Method for Linear Hyperbolic Systems*

June 1996: 1006 AFOSR Grantees/Contractors Meeting in Computational & Physical Mathematics, Wright Patterson Air Force Base, Dayton, OH

*A Finite Difference Method for Highly Dispersive Wave Equations*

January 1997: AFOSR Electromagnetics Workshop, San Antonio, TX

*A Finite Difference Method for Dispersive Linear Waves*

March 1997: Particle Technology Symposium, Particle Technology Center & Particle Processing Research Center, NJIT, Newark, NJ

*Sedimentation and Fluid-Particle Systems*

May 1997: EMCC Electromagnetic Code Consortium Meeting, Wright Patterson AFB, Dayton OH

*A Finite Difference Method for Dispersive Linear Waves*

## **Zoi-Heleni Michalopoulou**

March 1996: Technical Workshop on Undersea Warfare Superiority, New London, CT

*Environmentally Adaptive Robust Processing of Sea Test Data*

May 1996: International Conference on Acoustics, Speech and Signal Processing

1. *Focalization in the Gulf of Mexico*

2. *A Coherent Approach to Broadband Matched-field Processing: Application*

*to the Hudson Canyon*

June 1996: 3rd European Conference on Underwater Acoustics, Greece

1. *Simulated Annealing and Genetic Algorithms for Broadband Source Focalization*

2. *Shallow Water Bottom Properties via Matched Field Processing on a Vertical Array*

June 1996: 8th International Workshop on Matched Field Processing, Victoria, BC, Canada

*Active Matched-field Processing*

December 1996: 132nd Meeting of the Acoustical Society of America, Honolulu, Hawaii

*Detection Improvements of Active Sonar Processing: Accounting for Time Dispersive Properties of Medium in the Matched-filter Replica*

### **Petronije Milojevic**

June 1997: 7th International Workshop in Analysis, University of Maine, Orono, ME

*Solvability of Semilinear Equations Involving Fredholm Maps of Nonnegative Index and Applications*

### **Demetrios Papageorgiou**

January 1996: Mathematics Colloquium, Departamento de Matematica, Universidad Tecnica

Federico Santa Maria, Valparaiso, Chile

*Description of Jet Breakup*

March 1996: Department of Chemical Engineering and Center for Applied Mathematics, University of Notre Dame, Southbend, ID

*Analysis of Jet Breakup*

July 1996: Symposium on Rheology and Computational Fluid Mechanics: Dedicated to the Memory of Professor Tasos Papanastasiou, University of Cyprus

*Analysis of Jet Breakup*

September 1996: Euromech Symposium on Interfacial Instabilities, Ecole Polytechnique, Paris, France

*Breakup of Liquid Threads*

November 1996: Department of Mathematics, Imperial College of Science, Technology, and Medicine, London, England

*Analysis of Jet Breakup*

November 1996: Department of Applied Mathematics and Theoretical Physics (DAMTP), Cambridge University, England

*Analysis of Jet Breakup*

January 1997: Laboratoire de Hydrodynamique, Ecole Polytechnique, Paris

*Ordered and Disordered Dynamics of Some Fluid Flows*

February 1997: Department of Mathematics, University College, London, England

*Analysis of Jet Breakup*

February 1997: Department of Mathematics, University of Manchester, Manchester, England

*On the Breakup of Liquid Threads*

February 1997: Department of Mathematics, Imperial College of Science, Technology, and Medicine, London, England

*Ordered and Disordered Dynamics in Core-annular Flows*

**Michael Porter**

June 1996: (Proceedings of the Eighth Matched Field Processing Workshop), DREP, Victoria Canada

*Active Matched-field Processing*

1996: SCNR Meeting, Lisbon, Portugal

*Shallow water Tomography for Internal Tide Estimation: Preliminary results of INTIMATE '96'*



October 1996: ONR/DARPA Shallow-Water Acoustics Workshop, National Research Laboratory

*Preliminary Acoustic Results from the INTIMATE '96' Shallow Water Tomography Experiment*

January 1997: Proceedings of the Environmentally Adaptive Sonar Technology Symposium, University of Washington

*One-way Active Tracking in the INTIMATE '96' Experiment*

March 1997: Proceedings of the 1997 Technical Workshop on Submarine Acoustic Superiority, NUWC, Newport, RI

*Environmental Matched and Adaptive Technology*

April 1997: Proceedings of the International Conference on Shallow Water Acoustics, Beijing, China

*Exploiting Reliable Features of the Ocean Channel Response*

April 1997: Proceedings of the International Conference on Shallow Water Acoustics, Beijing, China

*INTIMATE '96': A Shallow Tomography Experiment Devoted to the Study of Internal Tides*

June 1997: Geoacoustic Benchmark Workshop, Vancouver, Canada

*INTIMATE '96': A Shallow Water Experiment to Study Internal Tides*

## **Bonnie Ray**

March 1996: International Conference on Financial Engineering, New York, NY

*Data-driven Methods for Nonlinear Time Series Analysis Multivariate Adaptive Regression Splines (MARS) and Transform-Expand-Select (TES)*

July 1996: Sydney International Statistical Conference, Sydney, AU

*Bayesian Estimation Methods for Multivariate ARMA and ARFIMA Processes*

July 1996: Workshop on Nonlinear Time Series and Chaos, Canberra, AU

*Modeling Periodic Threshold Autoregressions Using TSMARS*

August 1996: Joint Statistical Meeting, Chicago, IL

*Model Selection and Forecasting for Long-range Dependent Processes*

**Michael Siegel**

February 1996: Fluid Mechanics Seminar. Levich Institute, City College, NY

*Effects of Small Surface Tension on a Smoothly Evolving Hele-shaw Interface*

April 1996: Applied Mathematics Seminar, Courant Institute, NY University, NY

*The Effects of Small Surface Tension on a Smoothly Evolving Hele-Shaw Interface*

October 1996: Royal Society Meeting, Royal Society, London, England

*Effects of Small Surface Tension on a Smoothly Evolving Hele-Shaw Interface*

October 1996: Mathematical Institute, Oxford, United Kingdom

*Singular Perturbation of Smoothly Evolving Hele-Shaw Profiles*

April 1997: Conference on Singularities in Euler and Navier-Stokes, Ohio State University, OH

**Burt Tilley**

January 1996: Department of Mathematical Sciences, University of Massachusetts, Lowell, MA

*On Translationally Invariant Patterns*

February 1996: Levich Institute, City College, New York, NY

*On Countercurrent Two-Layer Flows*

September 1996: Laboratoire d'Hydrodynamique, Ecole Polytechnique, Pasaiseau, France

*On Symmetric Patterns in Two-layer Flows*

October 1996: Institute for Applied Mathematics, Technical University of Munich, Munich, Germany

*On Symmetric Patterns in Two-layer Flows*

November 1996: Laboratoire de Modelisation en Mechanique, University of Pierre and

Marie Curie, Paris, France

*On Symmetric Patterns in Two-layer Flows*

March 1997: Annual Gesellschaft fuer Angewandte Mathematik und Mechanik (GAMM) Meeting,

Regensburg, Germany

1. *Two Fluid Stagnation-point Flows*

2. *On Nonlinear Evolution of Holmboe Waves*

April 1997: Department of Applied Mathematics and Theoretical Physics (DAMPT),

University of Cambridge, England

*Solutions and Patterns in Two-fluid Flows*

May 1997: Laboratoire de Physique Statistique, Ecole Normale-Superieure, Paris, France

*Solutions and Patterns in Two-fluid Flows*

## **C. CAMS REPORTS**

96-10: B.S. Tilley, S.H. Davis, and S.G. Bankoff

*On Symmetric Long-Wave Patterns in Two Layer Flows*

96-11: Vladislav V. Goldberg, and Maks A. Akivis

*On a Normalization of a Grassmann Manifold*

96-12: Vladislav V. Goldberg, and Maks A. Akivis

*Conformal Differential Invariant and the Conformal Rigidity of Hypersurfaces*

96-13: P.S. Milojevic

*Approximation - Solvability of Hammerstein Equations*

96:14 Michael Siegel, Saleh Tanveer, and Wei-Shen Dai

*Singular Effects of Surface Tension in Evolving Hele-Shaw Flows*

96:15 Bonnie Ray, and Nalini Ravishanker

*Bayesian Analysis of Vector Arma Model Using Gibbs Sampling*

96-16: B.S. Tilley, S.H. Davis, and S.G. Bankoff

*Unsteady Stokes Flow Near a Oscillating Contact Line*

96-17: G.A. Kriegsmann

*Hot Spot Formation in Microwave Heated Ceramic Fibers*

96-18: H.R. Chaudhry, B. Bukiet, T. Findley, and A.B. Ritter

*Evaluation of Material Constants in Rabbit Skin Considering Residual Stresses*

96-19: H.R. Chaudhry, B. Bukiet, T. Findley, and A.B. Ritter

*Residual Stresses in Oscillating Thoracic Arteries Increase Blood Flow*

96-20: N. Aubry, M. Rahibe, and S.I. Sivashinsky

*Bifurcations in a Planar Propagating Flame as the Size of the Domain Increases*

96-21: N. Aubry, and Shaojie Tang

*Direct Numerical Simulations of the Impulsively Started Flow Past a Circular Cylinder*

*in its Transient and Asymptotic Regimes*

96-22 Denis Blackmore, A. Prykarpatsky, W. Strampp, Yu Sydorenko, and R. Samulyak

*On Lagrangian and Hamiltonian Formalisms for Infinite-Dimensional Dynamical Systems  
with Symmetries*

96-23 Denis Blackmore, Ming C. Leu, and L.P. Wang

*The Sweep-Envelope Differential Equation Algorithm and its Application to NC Machining  
Verification*

96-24 Denis Blackmore and Jack G. Zhou

*Fractal Analysis of Height Distributions of Anisotropic Rough Surfaces*

96-25 Stuart Booker

*The Galerkin Approximation of the Electric Field Integral Equation and its Conservation Laws*

97-10 P.S. Milojevic

*Implicit Function Theorems, Approximate Solvability of Nonlinear Equations and Error Estimates*

97-11 Hans Chaudhry, Bruce Bukiet, Thomas Findley, A.B. Ritter, and N. Guzelsu

*Mathematical Modeling of Wound Closure Stresses*

97-12 D. Terman, N. Kopell, and A. Bose

*Dynamics of Two Mutually .Coupled Slow Inhibitory Neurons*

97-13 Stuart Booker, Paul Smith, and A.P. Lambert

*A Numerical Determination of Transient Antenna Impedance Via Near-field Integration*

97-14 Nadine Aubry

*On the Mechanism of Vortex Shedding*

97-15: V.V. Goldberg, and M.A. Akivis

*On the Theory of Almost Grassmann Structures*

97-16: V.V. Goldberg, and M.A. Akivis

*On Conformal Invariance of Isotropic Geodesics*

97-17: C.V. Hile, and G.A. Kriegsmann

*A Hybrid Numerical Method Method for Loaded Highly Resonant Single Cavities*

97-18 V.V. Goldberg, and M.A. Akivis

*Conformal and Grassmann Structures*

97-19 Zoi-Heleni Michalopoulou

*Robust Multi-Tonal Matched Field Inversion: A Coherent Approach*

97-20 M.C. Bhattacharjee

*Discrete Convex Ordered Lifetimes: Characterization, Equivalence and Applications*

97-21 M.C. Bhattacharjee

*Exponentiality Within Class L and Stochastic Equivalence of Laplace Ordered Survival Times*

97-22 Nadine Aubry

*Hierarchical, Self-Sustained Energy Cascade to Small Scales in Wall-Bounded Shear Turbulence*



## **X. EXTERNAL ACTIVITIES AND AWARDS**

**Daljit S. Ahluwalia**



Member, United States National Committee/Theoretical and Applied Mechanics, National Research Council, 1995-1999.

**Bruce Bukiet**

Associate Editor, SIAM Journal on Scientific & Statistical Computing

**Vladislav Goldberg**

Editor, Journal Webs and Quasigroups, Tver State University, Tver State University

Men of Achievement, 17th ed., 1996.

**Gregory A. Kriegsmann**

Editorial Board, SIAM Journal on Applied Mathematics

Editorial Board, SIAM Review

Editorial Board, Journal of Engineering Mathematics

Editorial Board, IMA Journal of Applied Mathematics

Editorial Board, Methods and Applications of Analysis

Member, Organizing Committee for the International Union of Theoretical and Applied Mechanics (IUTAM), program on Numerical Computations on Infinite Regions

Member, Organizing Committee for the First World Congress on Microwave Processing

**Michael Lacker**

Editorial Board, Journal of Theoretical Biology

**Petronije Milojevic**

Editorial Board, Communications on Applied Nonlinear Analysis

Editorial Board, Factor Universitatis

**Bonnie Ray**

## Editorial Board, Business and Management Forecasting