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I. FROM THE DIRECTOR

During 1993 CAMS has made rapid progress in many aspects of its mission to promote and sustain research in the mathematical sciences at NJIT. The concrete evidence of this progress documented in this report includes increased numbers of publications, research proposals, and externally funded projects. Distinguished visitors, including speakers in the highly regarded CAMS/Math Seminar Series and long term research collaborators, a first rate computational laboratory, the rapidly developing CAMS Reading Room, and the 1993 CAMS Reports are further testimony to the continued development of the infrastructure essential to high quality research in the mathematical sciences. Our accomplishments in 1993 come despite a temporary thinning of CAMS senior leadership occasioned by the sabbatical and other leaves of four senior CAMS members during parts of 1993. This includes CAMS Director, Prof. Daljit S. Ahluwalia, who took leave from NJIT in the fall to serve as the Director of the Applied Mathematics Program at the National Science Foundation. The absence of these colleagues has diminished our capacity to pursue some of the long term goals of CAMS; happily, the redoubled efforts of the full spectrum of remaining CAMS members from the senior level to those joining midyear have allowed us to sustain earlier accomplishments and to advance in the important areas mentioned earlier.

Jonathan Luke
CAMS Acting 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, the Committee on Research and Scholarly Activities, the Committee on Seminars and Colloquia, the Committee on Computational Facilities, and the Committee on Research Facilities. But the essential nature of the organization is that of a voluntary association of individual researchers joined in a collegial collaboration to enhance mathematical work at NJIT.

CAMS undertakes a wide range of activities in pursuing its mission. Since cutting edge research requires that its members be in steady contact with international scientific and engineering communities, CAMS brings researchers from academia, industry, and government to NJIT for both short term visits (e.g., seminar presentations) and for long term stays (e.g., sabbatical leaves). CAMS fosters research collaborations between 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 appoints Research Professors to formalize this relationship so that grants can be jointly pursued.

CAMS activities also include support for the submission of research proposals which is done through dissemination of information, organization of group efforts, and administrative assistance to proposers. Senior members of CAMS commit significant amounts time and effort in providing guidance and advice to young researchers in their efforts to procure funding. Finally, CAMS fosters and encourages research among its members by arranging the acquisition of necessary resources.

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.

The accomplishments of CAMS are built on the efforts and support of many individuals. CAMS is deeply indebted to President Saul Fenster whose vision has created an environment in which the aspirations of CAMS are espoused and appreciated. CAMS is also deeply indebted to Provost Gary Thomas for his pivotal role in realizing this vision and in particular for his unflagging assistance and support. And finally, CAMS is very appreciative of the deep commitment of Gregory Kriegsmann, Chairman and Foundation Chair of Applied Mathematics, whose generous supply of resources, advice, and energy have been instrumental in our ongoing success.

III. MEMBERSHIP AND VISITORS

Department of Mathematics

Ahluwalia, Daljit S. - **Director** (on leave to NSF)
Andrushkiw, Roman
Bhattacharjee, Manish
Blackmore, Denis
Booty, Michael
Bukiet, Bruce
Dhar, Sunil
Dios, Rose
Elancheran, Ponniah
Goldberg, Vladislav
Hile, Cheryl
Huang, Xun-Cheng
Kriegsmann, Gregory
Lacker, Michael
Luke, Jonathan - **Acting Director**
Milojevic, Petronije
Nachbin, Andre
Papageorgiou, Demetrius
Perez, Manuel
Porter, Michael
Ray, Bonnie
Sran, Kewal
Stickler, David
Tavantzis, John
Wagner, Barbara

Department of Mechanical & Industrial Engineering

Rosato, Anthony
Dave, Rajesh

Department of Civil & Environmental Engineering

Meegoda, Namunu

CAMS Research Professors

Chaudhry, Hans
Findley, Thomas

Long-Term Visitors

Prykarpatskyj, Anatolij K.	Ukrainian Academy of Sciences L'viv, Ukraine
Samoilenko, Valerij	Ukrainian Academy of Sciences Kiev, Ukraine

Short-Term Visitors

Jones, Douglas	The University of Dundee United Kingdom
Livingston, Ellen	Naval Research Laboratory
Abrahams, David	Keele University United Kingdom
Huerta, Antonio	Polytechnical University of Catalonia Barcelona, Spain

IV. SEMINARS, WORKSHOPS AND SHORT COURSES

A. THE CAMS/MATHEMATICS SEMINAR SERIES

George D. Byrne

Exxon Research and Engineering Company, Annandale, NJ

The Taming of a Co-Polymerization Problem with VODE

Chjan Lim

Department of Mathematics, Rensselaer Polytechnic Institute, Troy, NY

New Results in Vortex Dynamics

J. K. Percus

Courant Institute, New York University, NY

Independent Non-identical Bernoulli Trials: How to Use Minimal Information

Charles Maldarelli

Levich Institute for Physicochemical Hydrodynamics, CUNY, NY

The Axisymmetric Thermocapillary Motion of a Fluid Particle in a Tube

P. Garabedian

Courant Institute, New York University, NY

High Performance Computer Codes to Design a Nuclear Reactor using Magnetic Fusion

Philip Rosenau

Department of Mechanical Engineering, Technion, Haifa, Israel

The Compacton: A Soliton with Compact Support

Hira Koul

Department of Statistics, Michigan State University, East Lansing, MI

Weighted Empiricals and Robust Autoregression

Bimal K. Sinha

Department of Mathematics and Statistics, University of Maryland at Baltimore County, Baltimore, MD

Meta-Analysis: Combining Independent F-tests

Manish Bhattacharjee

Department of Mathematics, NJIT, Newark, NJ

Aging Renewal Process Characterizations of Exponential Distributions

J. R. M. Hosking

IBM Research Division, Yorktown Heights, NY

L-Moments

Mohammad Ahsanullah

Department of Management Science, Rider College, Lawrenceville, NJ

Record Values of Univariate Distributions

Alexandria Tolstoy

Naval Research Laboratory, Washington, DC

Matched Field Processing for the Determination of Ocean Environmental Parameters

Robert Pfeffer

Department of Chemical Engineering, NJIT, Newark, NJ

Dust Filtration in Fibrous and Granular Beds

Ponniah Elancheran

William M. Mercer Ltd., Toronto, Canada

Numerical Solutions of some Stochastic Differential Equations

Cheryl Hile

Department of ES/AM, Northwestern University, Evanston, IL

A Numerical and Asymptotic Solution to Maxwell's Equations for Non-Linear Optical Pulse Propagation

Peter Lewis

Operations Research Department, Naval Postgraduate School, Monterey, CA

Statistical Simulation using the APL2/Agss Computing Environment

Yiorgos S. Smyrlis

Department of Mathematics, University of Manchester, United Kingdom

Travelling Discrete Shocks

Oscar Bruno

Department of Mathematics, Georgia Institute of Technology, Atlanta, GA

A Method of Variation of Boundaries for the Solution of Diffraction Problems

Harold Layton

Department of Mathematics, Duke University, Durham, NC

Bifurcation Analysis of Oscillations in Tubuloglomerular Feedback

Elisabeth Guazelli

Physique et Mecanique de Milieux Heterogenes, Ecole Supieriure de Physique et de Chimie Industrielles, Paris, France

Brownian Speres

Claude Ghidaglia

Physique et Mecanique de Milieux Heterogenes, Ecole Supieriure de Physique et de Chimie Industrielles, Paris, France

Deep Bed Filtration

Kam-Chuen Ng

Computational Sciences Laboratory, Eastman Kodak Company, Rochester, NY

Dissolution Kinetics with Feedback

Michael Lacker

Department of Mathematics, NJIT, Newark, NJ

A Simple Mathematical Theory of Walking with Applications to the Physically Disabled

Denis Blackmore

Department of Mathematics, NJIT, Newark, NJ

New Applications of Fractal Geometry To Rough Surfaces

Anis Mitra

United Nations Statistics Division, United Nation Building, NY

Dual System Evaluation of Statistical Counts

Richard Evans

Science Application International Inc., New London, CT

A Boundary Integral Equation Approach to Three-Dimensional Acoustic Radiation

Peter Castro

Applied Mathematics & Statistics, Eastman Kodak Company, Rochester, NY

Level Crossing by Random Surfaces

William L. Kath

Department of Mathematics, Northwestern University, Evanston, IL

Phase-sensitive Amplification of Pulses in Nonlinear Optical Fibers

Tamar Schlick

Courant Institute, New York University, NY

Computer Simulation of Supercoiled DNA

Brent W. Linquist

Department of Applied Mathematics & Statistics, State University of New York at Stony Brook, NY

A Model for Fluid Dispersion in Porous Media

Donald Schwendeman

Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, NY

The Accuracy and Calculation of Shock Wave Propagation Using Geometrical Shock Dynamics

S.A. Vanderweil

Data Analysis Research Department, AT&T Bell Laboratories, Murray Hill, NJ

Understanding Data Models through Graphics

Anatoly K. Prykarpatskyj

Institute for Applied Problems of Mechanics & Mathematics, Ukrainian Academy of Sciences, L'viv, Ukraine

Coherent States and Their Application to Lax Integrable Dynamical Systems

Douglas S. Jones

Department of Mathematical Sciences, University of Dundee, UK

Absorbing Boundary Conditions

Richard Meyer

Department of Mathematics, University of Wisconsin, Madison, WI

Two Disasters in Modeling

Bonnie Ray

Department of Mathematics, NJIT, Newark, NJ

Nonlinear Modeling of Multivariate and Categorical Time Series Using MARS

David A. Edwards

Applied Mathematics, California Institute of Technology, Pasadena, CA

Non-Fickian Behavior in Polymer-Penetrant Systems

Yuriko Yamamuro Renardy

Department of Mathematics, Virginia Polytechnic Institute & State University, Blacksburg, VA

Sideband Instability for a Two-Layer

B. CAMS WORKSHOPS ON MATHEMATICAL PROBLEMS AT NJIT

HUMAN WALKING: THEORY, MEASUREMENT AND APPLICATIONS

Michael Lacker, Department of Mathematics, NJIT
Sue Ann Sisto, Kessler Institute for Rehabilitation
Wanda Boda, East Orange Veterans Administration Hospital
Thomas Findley, New Jersey School of Medicine & Dentistry

NONLINEAR STABILITY PROBLEMS IN FLUID DYNAMICS

Denis Blackmore

Department of Mathematics, NJIT, Newark, NJ

Vortex Breakdown Flows

Demetrius Papageorgiou

Department of Mathematics, NJIT, Newark, NJ

Nonlinear Dynamics in Oil Recovery and Transport

Andre Nachbin

Department of Mathematics, NJIT, Newark, NJ

Gravity Waves in Channels with Large Periodic Random Depth Variations

PROBLEMS IN FLUID DYNAMICS

Jonathan Luke

Department of Mathematics, NJIT, Newark, NJ

Numerical Simulation of Gravity Driven Filtration

Abraham Harnoy

Department of Mechanical & Industrial Engineering, NJIT, Newark, NJ

Parallel Flow Stability for Viscoelastic Fluids

Thomas Borne

Computations and Analysis, Westfield, NJ

Activated Carbon: Modeling, Product Design and Control

C. SHORT COURSES

Luke, Jonathan

Department of Mathematics, NJIT

C for Scientific Computation

Papageorgiou, Demetris

Department of Mathematics, NJIT

Introduction to Fluid Dynamics

Sideras, Michael

Department of Mathematics, NJIT

E-Mail, Telnet, Ftp and X-windows

Dhar, Sunil

Department of Mathematics, NJIT

MATHEMATICA

V. EXTERNALLY SPONSORED RESEARCH

A. NEW PROJECTS (Beginning in 1993)

1. *Microwave Processing of Ceramic Materials*

   National Science Foundation: August 1993 - January 1996

   Gregory A. Kriegsmann
   Barbara Wagner

2. *Mathematical Sciences Computing Research*

   National Science Foundation: September 1993 - February 1995

   Jonathan Luke-substituting for D.S. Ahluwalia
   Sunil Dhar
   Manish Bhattacharjee
   Bonnie Ray
   Rose Dios

3. *Collaborative Research Grant, CAST program*

   National Research Council: October 1993 - July 1994

   Roman Andrushkiw
   Valeri Samoilenko - Kiev University
   Anatoly Prykarpatsky - Kiev University

4. *Student Support Grant, REAP Program*

   National Academy of Sciences & CAST: August 1993 - June 1994

   Roman Andrushkiw
   V. Korolevich

5. *Rapid 3D Focalization*

   Naval Research Laboratory: September 1993 - September 1994

   Michael Porter

6. *Intergovernmental Assignment*

   National Science Foundation: August 1993 - August 1994

   Daljit S. Ahluwalia

B. CONTINUING PROJECTS (Beginning before 1993)

1. *Mathematical Methods in Applied Wave Propagation*

   Office of Naval Research: October 1992 - September 1994

   Gregory A. Kriegsmann
   Michael Porter

2. *Dynamics of Dissipative-Dispersive PDE's Modeling Two-Phase Flow in a Pipe*

   North Atlantic Treaty Organization: April 1992 - April 1994

   Demetrius Papageorgiou
   Yiorgos Smyrlis-University of Manchester
   Stathis Filippas-Universite Pierre et Marie Curie (Paris VI)

3. *Mathematical Modeling of Ampute-Gait and Blood Flow*

   University of Medicine & Dentistry: January 1993 - December 1993

   Michael Lacker
   Hans Chaudhry

4. *Mathematical Science Computing Research Environments*

   National Science Foundation: July 1992 - December 1993

   Jonathan Luke-substituting for D.S. Ahluwalia
   Gregory A. Kriegsmann
   Bruce Bukiet
   Michael Porter

5. *Mathematical Science Computing Research Environments*

   National Science Foundation: July 1992 - December 1993

   Jonathan Luke-substituting for D.S. Ahluwalia
   Demetrius Papageorgiou
   Anthony Rosato
   Rajesh Dave

6. *Analysis of Swept Volumes*

   National Science Foundation: September 1991 - August 1993

   Denis Blackmore
   Ming C. Leu

7. *Representation and Analysis of Swept Volumes with Tolerance and Deformation*

   Office of Naval Research: September 1992 - August 1995

   Denis Blackmore
   Ming C. Leu
   Frank Shih

8. *A Three Dimensional Particle Tracking System*

   Sun Microsystem AEG Program: May 1992 - May 1993

   Rajesh N. Dave
   Anthony Rosato
   Bruce Bukiet

9. *Applied Mathematical Problems in Modern Electromagnetics*

   Air Force Office of Scientific Research: June 1991-May 1997

   Gregory A. Kriegsmann

C. NON-CAMS PROJECTS WITH CAMS PARTICIPATION

1. *Computation of Unsteady Boundary Layers and Stability of Compressible Wakes and Shear Layers*

   National Aeronautics & Space Administration: September 1990 - March 1994

   D.T. Papageorgiou
   A.A. Acrivos-Levich Institute

2. *Dynamics of Curved Detonations*

   Los Alamos National Laboratory: September 1989 - June 1995

   R. Menikoff - Los Alamos National Laboratory
   K. Lackner - Los Alamos National Laboratory
   B. Bukiet

VI. PROPOSED RESEARCH

A. CAMS PROPOSALS

1. *Spatial and Temporal Chaotic Motion Criteria in Kinetic, Hydrodynamic and Mechanical Systems via Algebraic-Analytical Methods*

   National Science Foundation

   A.K. Prykarpatskyj
   V. Hr. Samoilnko

2. *Computational Methods for Fluid Problems with Multiple Time Scales*

   US Department of Energy

   Bruce Bukiet

3. *The Effect of Surfactants on the Stability of Core Angular Flows with Application to Enhanced Oil Recovery*

   National Science Foundation

   Demetrius Papageorgiou

4. *Dynamics of Multi-Fluid Flows and Interfaces*

   National Science Foundation

   Demetrius Papageorgiou

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

   Department of Energy

   Gregory A. Kriegsmann

6. *Non-linear Wave Propagation in Disordered Media*

   National Science Foundation

   André Nachbin

7. *Sample Survey Using the Binary Sequence of Order K*

   National Science Foundation

   Sunil K. Dhar

8. *The Modulation of Flames of Various Types in a Premixed Environment*

National Science Foundation

Michael Booty

9. *Modeling Curved Detonations*

National Science Foundation

Bruce Bukiet

10. *Modeling & Analysis of Ageing in Maintained Systems*

National Science Foundation

Manish Bhattacharjee

11. *Mathematical Sciences Computing Research Environments*

National Science Foundation

Jonathan Luke
Michael Booty
Cheryl Hile
Michael Lacker
André Nachbin

12. *Broadband Localization*

Naval Undersea Warfare Center

Michael B. Porter

13. *Shallow-Water Broadband Detection and Localization*

Office of Naval Research

Michael B. Porter

14. *Three-Webs Formed by Foliations of Different Dimensions*

National Research Council

Vladislav Goldberg
A.M. Shelekhov, Tver Stat University - Russia

15. *Rank Problems for Webs*

National Science Foundation

Vladislav Goldberg

16. *Integrated 3-D Dynamic Model of Ak/BK Socket & Gait*

National Institute of Health

Michael Lacker
Thomas Findley-Kessler Institute

17. *A Mechanism for Instability in the Ocean's Carbon Cycle*

National Science Foundation

Stuart Gaffin - Environmental Defense Fund
Jonathan Luke
Tyler Volk - New York Universtiy

18. *Mathematical Problems in Modern Electrodynamics*

Air Force Office of Scientific Research

Gregory A. Kriegsmann
Cheryl Hile
Jonathan Luke

B. NON-CAMS PROPOSALS WITH CAMS PARTICIPATION

1. *The Use of Surfactants in the Remobiliation of Bubbles in Thermocapillary Migration*

National Aeronautics & Space Administration

D. T. Papageorgiou
C. Maldarelli - City College, New York

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

Air Force Office for Scientific Research

D. T. Papageorgiou
Philip Hall - University of Manchester

3. *Training Industry in Performing Calculations of Equilibrium and Detailed Reaction Kinetic Simulations for Incineration Processes: Chlorocarbons, Chlorinated Dibenzo Dioxins and Furans*

Environmental Protection Agency

Michael Booty
Joseph W. Bozzelli - Department of Chemical Engineering, NJIT

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

Procter and Gamble, Inc.

Michael Booty
Joseph Bozzelli - Department of Chemical Engineering, NJIT
Leu Krasnoperov - Department of Chemical Engineering, NJIT

5. *Particulate Technology in Manufacturing Processes*

National Science Foundation

Robert Pfeffer - Department of Chemical Engineering, NJIT
Rajesh Dave
Anthony Rosato
Ian S. Fischer - Department of Mechanical Engineering, NJIT
Jonathan Luke

6. *Particulate Technology in the Undergraduate Curriculum*

National Science Foundation

Robert Pfeffer - NJIT Department of Chemical Engineering, NJIT
Rajesh Dave
Anthony Rosato
Ian S. Fischer - Department of Mechanical Engineering, NJIT
Jonathan Luke

VII. FACILITIES

A. CAMS/MATH COMPUTATIONAL LABORATORY

Committee on Computational Facilities:

Manuel Perez, Co-Chariperson
Michael Porter, Co-Chairperson
André Nachbin
Demetrius Papageorgiou

Laboratory Assistants:

Nicholas Antoniou
Michael Sideras

The network of workstations and PC's supported by CAMS has improved significantly over the last year. Again a great deal of credit goes to the lab assistants, Michael Sideras and Nicholas Antoniou.

Professors Bhattacharjee, Dhar, Dios and Ray were awarded an NSF equipment grant to improve the facilities for statistical work. As a result a fast workstation (an HP 715/75) was purchased and configured with various standard packages for statistical research (StatSci and IMSL).

In order to provide for the needs of several new faculty, three HP 715/33 workstations were purchased. These machines have been fully configured with HP Fortran and GNU C compilers and LaTeX.

On our large computational server, an HP 735, we have installed several new software packages including MATLAB, MATHEMATICA and IMSL. These programs are readily used on every X-windows based workstation in the department and have proven extremely popular.

In terms of networking, our configuration has been completely re-done. We purchased 'DEMPR' boxes that allowed us to configure our workstations in a local network. This makes our network of workstations less susceptible to campus-wide interruptions and also improves the response. Also, these additional ethernet connections free us from having to rewire every time workstations are moved or new ones added.

Lastly, a high-density Digital Audio Tape system was purchased to perform system-wide backups. All departmental workstations are now backed-up twice a week.

B. CAMS READING ROOM

Committee on Research Facilities:

André Nachbin
Bonnie Ray

The CAMS Reading Room, located in Cullimore 607, officially opened in September, 1993. The reading room serves as a depository for research texts, journals, preprints and reprints of articles by CAMS members, software manuals, and funding information. Prof. Greg Kriegsmann donated approximately 4 boxes of research texts to the reading room in August, 1993, and other CAMS members have also been kind enough to donate additional books and journals to the room during the year. It is hoped that the centralized availability of these materials will aid in the research activities of CAMS members. The room is also designed to serve as place where CAMS members can meet informally and discuss their work. To this end, informal teas in the Reading Room have been planned every two weeks during the semester.

VIII. PUBLICATIONS AND PRESENTATIONS

A. PUBLICATIONS

Andrushkiw, Roman

Iterative Method for a Class of Nonlinear Eigenvalue Problems, Applicable Analysis, Vol. 51. pp 211-220, 1993.

Bhattacharjee, Manish

How Rich are the Rich? Modeling Affluence and Inequality via Reliability Theory, Sankhya: Series B, Vol. 55-Part 1, pp. 1-26, 1993.

Aging Renewal Process Characterizations of Exponential Distributions, Microelectronics and Reliability, Vol., 33 (14), pp. 2143-2147, 1993.

Blackmore, Denis

Fractal Geometry Model for Wear Prediction, (with M.C. Leu and G. Zhou), Int. Journal of Wear, Vol. 170, pp. 1-14, 1993.

Applications of Sweep Differential Equation Method to Multiaxis NC Machining, (with M.C. Leu), Proceedings 1993 Sino-German Joint Symposium on Precision and High Speed Manufacturing Technology, pp. 159-169, 1993.

Applications and Implementation of the Sweep Differential Equation Method, (with M.C. Leu), Proceedings of the 1993 NSR Grantees Conference on Design and Manufacturing, 1993, pp. 216-221, 1993.

Booty, Michael

Slowly Varying Filtration Combustion Waves, (with B.J. Matkowsky), European Journal of Applied Mathematics, vol. 4, pp. 205-224, 1993.

The Accommodation of Traveling Waves of Fisher's Type to the Dynamics of the Leading Tail, (with R. Haberman and A.A. Minzoni), SIAM Journal of Applied Mathematics, Vol. 53 No. 4, pp. 1009-1025, 1993.

Bukiet, Bruce

Non-Invasive Rigid Body Tracking, (with R. Dave, A. Rosato , I. Fischer and J. Volcy), Proceedings of the Fifth NSF-DOE Workshop on Flow Particulates and Fluids, Ithaca, New York, pp. 287-314, 1993.

Simulation of Turbulent Jet Combustion with Swirl Incorporating Detailed Chemistry, (with R. Barat), Proceedings of the Combustion Institute: Eastern States Section, Princeton, pp. 101-104, 1993.

Chaudhry, H.R.

Rotation of a Right Circular Cone About its Axis, International Journal Non-Linear Mechanics, 1993.

Dhar, Sunil

Computation of Certain Minimum Distance Estimators in AR[K] Model, Journal of American Statistical Association, Vol. 88 No. 421, March 1993.

A Novel Computational Approach Towards the Mill Matrix of Distributed Comminution Models, (with R.R. Mallepali and R.K. Mehta), Nov., 1993.

Goldberg, Vladislav

Rank Problems for Webs, Differential Geometry, Proceedings of the Symposium in Honour of Professor Su Buchin (Shanghai China, Sept. 17-23, 1991) eds. C.H. Gu, H.S. Hy, Y.L. Xin, World Scientific, Singapore/New Jersey/London/Hong Kong, pp. 59-78, 1993.

Curvilinear 4-Webs with equal Curvature Forms of its 3- Subwebs. Webs and Quasigroups, Tver State University, Tver, pp. 9-19, 1993.

Maks Aizikovich Akivis (on the occasion of his 70th birthday and 50 years of scientific activity) (with A.T. Fomenko, V.F. Kirichenko, V.V. Ryzhkov, A.M. Shelekhov), Webs and Quasigroups, Tver State University, Tver, pp. 4-8, 1993.

Laplace Transforms of Conjugate Nets and their Generalizations, (with M.A. Akivis), Rend. Sem. Mat. Messina Ser. II-14, no. 1, pp. 9-29, 1993.

Foliate Conformal Kahlerian Manifolds, (with R. Rosca), Rend. Sem. Mat. Messina Ser. II-14, No. 1, pp. 105-122, 1993.

On (n+1)-Subwebs of an (n+1)-Webs and Local Algebras Associated with Them, Acta Math. Hungar. Vol. 62, No. 1-2, pp. 57-79, 1993.

Projective Differential Geometry of Submanifolds (with M.A. Akivis), North Holland, Amsterdam, 1993.

Hile, Cheryl

A Numerical and Asymptotic Solution of Maxwell's Equations for Nonlinear Optical Pulse Propagation, (with W.L. Kath), Integrated Photonics Research Digest, Vol. 10, pp. 308-311, 1993.

Kriegsmann, Gregory A.

Acoustic Propagation in a Slowly Changing Ocean Environment: Radiation and Reflection at Cut-off, (with W. Kath, A.T. Minzoni, and E.L. Reiss), Journal of the Acoustical Society of America, Vol. 93, No. 1, 1993.

Microwave Heating of Dispersive Media, Siam Journal of Applied Mathematics, Vol. 53, No. 3, 1993.

Large Membrane Array Scattering, (with C.L. Scandrett), Journal of the Acoustical Society of America, Vol. 93, No. 6, 1993.

Formation of Hot Spots in Microwave Heated Ceramic Rods Microwaves: Theory and Applications in Materials Processing, ed. D.E. Clark, F.D. Gac, and W.H. Sutton, The American Ceramic Society, 1993.

Lacker, H.M.

Follicular Development and Ovulation in the Marmoset Monkey as Determined by Repeated Laproscopic Examination, (with Tardif S. Feuer), Biology of Reproduction Vol. 48, pp. 1113-1119, 1993.

A Gastric Acid Secretion Model, (with A.M. deBeus & T. Fabry), Biophysics Journal, Vol. 65, pp. 362-378, 1993.

Luke, Jonathan

A Variational Upper bound on the Renormalized Mean Sedimentation Speed in Concentrated Suspensions of Identical Randomly Arranged Spheres, SIAM Journal on Applied Mathematics, Vol. 53, p.1613, 1993.

Milojevic, P.S.

Solvability of Semilinear Equations and Periodic Solutions of Differential Equations, Proceedings First Congress of Nonlinear Analysis, 1993.

Solvability of Nonlinear Operator Equations with Strong Nonlinearities, Abstracts Amer. Math. Society, January, Vol. 14(1), p. 125, 1993.

Meegoda, Namunu

Microscopic Modeling of Drained Shear Strength and Stress-Strain Behavior of Saturated Granular Soils, (with P. Ratnaweera), Proceedings of the 2nd International Conference on Discrete Element Methods (DEM), pp 535-546, 1993

Petroleum Contaminated Soils in Hot Mix Asphalt Concrete- An Overview, (with Y. Chen, K.Y. Chuang, B.H. DuBose, D.R. Huang, and R.T. Mueller), Use of Waste Materials in Hot Mix Asphalt, ASTM STP p. 1193, 1993.

Simulation of the Behavior of Asphalt Concrete Using Discrete Element Method, (with K.G. Chang), Proceedings of the 2nd International Conference on Discrete Element Methods (DEM), pp. 437-448, 1993.

Nachbin, André

Modelling of Water Waves in Shallow Channels, Topics in Engineering Series, ISBN 156252 062 8, Computational Mechanics Publications, Southampton, U.K., 1993.

Papageorgiou, Demetrius

Breakup of Liquid Jets Governed by the Navier-Stokes Equations. Proceedings of the ICASE/NASA Langley Workshop on Transition, Turbulence and Combustion, 1993, ed. M.Y. Hussaini, Springer, New York, 1993.

Porter, Michael

Coupled Modes for Rapid Range-Dependent Modeling, with (F. Jensen, & C.M. Ferla), Computational Acoustics: Acoustic Propagation, (Proceedings of the 3rd IMACSW Symposium on Computational Acoustics at Harvard), ed. D. Lee, R. Vichnevetsky and A.R. Robinson, North- Holland, pp. 307-316, 1993.

Fast Normal Modes for RD Problems, (with F.B. Jensen and C.M. Ferla), Proceedings of the Second PE Workshop, Eds. S.A. Chin-Bing, D.B. King, J.A. Davis and R.B. Evans, Naval Research Laboratory, 1993.

Anomalous PE Results for Propagation in Leaky Surface Ducts, Journal Acoustical Society of America, Vol. 94 (3) pp. 1510-1516, 1993.

Surface Duct Propagation and the Ocean Mixed Layer, (with S. Piacsek, L. Henderson and F. Jensen). Invited chapter for a forthcoming book **Coupled Ocean Prediction and Acoustic Propagation Models**, eds. A. Robinson and D. Lee, American Institute of Physics, 1993.

Ray, Bonnie

ASTAR, SMASTAR, and CASTAR: Modeling Time Series Using Multivariate Adaptive Regression Splines (MARS), (with P.A.W. Lewis and J.G. Stevens), in Predicting the Future and Understanding the Past, eds. A. Weigend and N. Gershenfeld SFI Studies in the Sciences of Complexity, Proceedings Vol. XVII, Addison-Wesley, pp. 297-318, 1993.

Nonlinear Modeling of Multivariate and Categorical Time Series Using Multivariate Adaptive Regression Splines, (with P.A.W. Lewis), in Advances in Nonlinear Time Series and Chaos - Vol. 1. Dimension Estimation and Models, ed. H.Tong, pp. 136-169, 1993.

Long-Range Forecasting of IBM Product Revenue Using a Seasonal Fractionally Differenced ARMA Model, International Journal of Forecasting, pp. 447-1 447-15, 1993.

Modeling Long-Memory Processes for Optimal Long-Range Prediction, Journal of Time Series Analysis, Vol. 14, No. 1, pp. 511-526, 1993.

Rosato, Anthony

Discrete Element Calculations of Granular Temperature and Solids Fractions in Vibrated Granular Beds, (with Y. Lan), Physical Review Letters, 1993.

Particle Dynamics Calculations of Wall Stresses and Slip Velocities for Granular Couette Flow of Smooth Inelastic Spheres, (with H. Kim), Continuum Mechanics and Thermodynamics, 1993.

Wagner, Barbara

Asymptotic Solution for Nonlinear Chemical Vapor Deposition Problems, (with B. Cassis and O. Tikhomirov), Quart. J. App. Math., Sept. 93, Vol. 195,97.

Robust Fluid Dynamical Closures of the Broadwell Model, (with C. D. Levermore) Phys. Let. A, Vol. 174, No.3, March 93, pp. 220-22, 1993.

B. PRESENTATIONS

Blackmore, Denis

January, 1993: Office of Naval Research Manufacturing Workshop, Office of Naval Research, Washington, DC
The Sweep Differential Equation Method

April, 1993: Mathematics Awareness Week Lecture, Newark, NJ, NJIT Math Club, (Annual Lecture)
Mathematics and Manufacturing: Perfect Together

May, 1993: Michigan Computer Aided Design Conference, Society for Industrial and Applied Mathematics, Ann Arbor, MI
Analysis and Modeling of Deformed Swept Volumes

August, 1993: 9th International Conference on CAD/CAM Robotics and Factories of the Future, Newark, NJ
The Flow Approach to Computer Aided Design/Computer Aided Manufacturing Modeling of Swept Volume

September, 1993: Applied Mathematics Seminar, NJIT
A New Fractal Model for Surface Topography

Booty, Michael

January, 1993: University of Bristol, Bristol, UK
Slow Time Modulation of Some Reaction Diffusion Systems in the Unstable Case

July, 1993: SIAM National Meeting, Philadelphia, PA
Time-Dependent Behavior of a Subsonic Flame

Bukiet, Bruce

January, 1993: Jornadas Panamericanas de Matematicas Aplicadas y Computacionales (First PanAmerican Workshop for Applied and Computational Mathematics), Caracas, Venezuela (with R. Menikoff)
Modeling Reaction Zone Effects in Curved Detonation Wave Problems

February, 1993: Seminar of the Department of Chemical Engineering, Chemistry and Environmental Science, NJIT, Newark, NJ
Introduction to Detonation Modeling

April, 1993: MSI/Stony Brook Conference in Nonlinear Analysis and Computation, Stony Brook, NY (with R. Menikoff)
The Curved Detonation Riemann Problem

July, 1993: Tenth International Detonation Symposium, Boston, MA
Understanding Curved Detonation Waves

July, 1993: SIAM Annual Meeting, Philadelphia, PA
The Curved Detonation Riemann Problem

November, 1993: APS Division of Fluid Dynamics Meeting Albuquerque, NM (with K. Lackner, R. Menioff)
Modeling Flows with Curved Detonation Waves

October, 1993: Joint NSF/DOE Meeting, Ithaca, NY (with A. Rosato, R. Dave, I. Fischer)
Non-Invasive Particle Tracking System for Granular Flows

October, 1993: Combustion Institute: Eastern States Section (with R. Barat)
Simulation of Turbulent Jet Combustion with Swirl Incorporation Detailed Chemistry

Dhar, Sunil

August, 1993: Joint Statistical Meetings, ASA, 153rd Annual Meeting, San Francisco, CA (with Kyohyup Yih)
Multinomial Extensions of Order K

November, 1993: Center for Applied Mathematics and Statistics, NJIT
MATHEMATICA

Goldberg, V.V.

January, 1993: Moscow State University, Seminar on Classical Differential Geometry, sponsored by NJIT and Russian University of People's Friendship
Laplace Transforms and their Generalizations in Projective Differential Geometry

January, 1993: Russian University of People's Friendship, Mathematical Seminar, sponsored by NJIT and Russian University of People's Friendship
On $(n+1)$-Subwebs of an $(n+1)$-Webs and Local Algebras Associated with them

January, 1993: Tver State University, Mathematical Seminar, sponsored by NJIT and Russian University of People's Friendship
Curvilinear 4-Webs with Equal Curvature Forms of its 3-subwebs

Hile, Cheryl

March, 1993: Optical Society of America's Integrated Photonic Research Meeting, Palm Springs, CA
A Numerical and Asymptotic Solution of Maxwell's Equations for Nonlinear Optical Pulse Propagation

July, 1993: Association for Women in Mathematics Workshop, SIAM Annual Meeting, Philadelphia, PA
A Numerical Solution of Maxwell's Equations for Nonlinear Optical Pulse Propagation

Kriegsmann, Gregory A.

March, 1993: Department of Mechanical and Aerospace Engineering, Rutgers
Acoustic Scattering by and Array of Baffled Membranes

April, 1993: American Ceramics Society, Cincinnati, OH
Formation of Hot Spots in Microwave Heated Ceramic Rods

June, 1993: J.B. Keller 70th Birthday Meeting, Rensselear Polytechnic Institute, Troy, NY
Large Membrane Array Scattering

July, 1993: Society For Industrial and Applied Mathematics, Philadelphia, PA
Localized Microwave Heating in Thin Ceramic Rods

September, 1993: Air Force School of Aerospace Medicine, San Antonio, TX
A Hybrid Method for Large Electromagnetic Gratings

September, 1993: University of Arizona, Tucson, AZ
Nonlinear Problems in Microwave Processing

September,1993: Department of Engineering and Applied Mathematics, Northwestern University, Evanston, IL
Microwave Processing of Ceramics

Luke, Jonathan

March, 1993: CAMS Workshop on Problems from Fluid Dynamics, Center for Applied Mathematics and Statistics, Newark, NJ
Numerical Simulation of Deep-Bed Filtration

June, 1993: CAMS Short Course, Center for Applied Mathematics and Statistics, Newark, NJ
C for Scientific Computation

July, 1993: Society for Industrial and Applied Mathematics Annual Meeting, Philadelphia, PA
A Hybrid Method for Propagation of Ultra-Sharp Pulses in Dispersive Media

Milojevic, Petronije

February, 1993: Colloquium Lecture, Department of Mathematics, University of Florida, Tampa, FL
Semilinear Equations and Applications

May, 1993: Steklov Mathematical Institute, Russian Academy of Sciences, Moscow, Russia
Approximation Solvability of Nonlinear Operator

Nachbin, André

February, 1993: Applied Mathematics Seminar, Penn State University, University Park, PA

March, 1993: Probability and Numerical Methods Conference, Paris, organized by INRIA

June, 1993: Second International Conference on Mathematical and Numerical Aspects of Wave Propagation, University of Delaware, organized by SIAM and INRIA

July, 1993: Society of Industrial and Applied Mathematics Annual Meeting, Philadelphia, PA
Water Waves Propagating over Large Amplitude Bottom Topographies

July, 1993: Third International Workshop in PDE's and Applications, Rio de Janeiro, organized by IMPA

September, 1993: Invited talk at Applied Mathematic Seminars, University of Delaware

November, 1993: Invited talk at Applied Math Seminars, State University of Campinas, Sao Paulo, Brazil

Papageorgiou, Demetrius

June, 1993: Levich Institute, City College of New York, New York, NY
Break-up of Liquid Jets

June, 1993: Courant Institute, New York University, New York, NY
Break-up of Liquid Jets

July, 1993: Minisymposium on Two-Fluid Flows and Interfacial Instabilities at the Society for Industrial and Applied Mathematics, Annual Meeting, Philadelphia, PA

November, 1993: Minisymposium on Two-Fluid Flows and Interfacial Instabilities, Annual Meeting of the American Institute of Chemical Engineers, St. Louis, MO

Porter, Michael

July, 1993: Society of Industrial and Applied Math. Annual Meeting, Philadelphia, PA
Common Grid Acoustics: Fusing Acoustic Tomography and Ocean Circulation Modeling

September 1993: Proceedings of the International Conference on Theoretical and Computational Acoustics
Finite Element Ray Tracing

Ray, Bonnie

March, 1993: Statistics Seminar, University of Connecticut, Storrs, CT
Modeling and Forecasting Long Memory Processes

June, 1993: 13th Annual International Symposium on Forecasting, Pittsburgh, PA
Nearly Nonstationary and Nonstationary ARMA Processes Misspecified as FARMA Processes and the Effect on Forecasts

July, 1993: Operations Research Seminar, Naval Postgraduate School, Monterey, CA
Nonlinear Modeling of Multivariate and Categorial Time Series using MARS

August, 1993: Joint Statistical Meeting-Annual Meeting of the American Statistical Association, San Francisco, CA
Identifying Permanent and Temporary Components in Japanese Stock Prices

August, 1993: IMS New Researchers Conference, Institute of Mathematical Statistics, Berkeley, CA
Current Research in Long Memory Processes

September, 1993: ISI Satellite Meeting: Time Series Applications in Meteorology and Astronomy, Padua, Italy
Nonlinear Modeling of Multivariate and Categorical Time Series Using Multivariate Adaptive Regression Splines

Wagner, Barbara

January, 1993: International Pan-American Conference, Caracas, Venezuela. Invited presentation.
Self-Similarity Solutions of Barenblatt's Equation

July, 1993: SIAM Annual Meeting, Philadelphia, PA (Minisymposium)
Self-Similarity Solutions of Barenblatt's Equation

September, 1993: Mathematics and Computer Division, Argonne National Lab, Argonne, IL
Self-Similarity Solutions of Barenblatt's Equation

November, 1993: Department of Mathematics, University of Wisconsin, Milwaukee, WI
Self-Similarity Solutions of Barenblatt's Equation

C. CAMS REPORTS

CAMS-001: Demetrios T. Papageorgiou and Adrian V. Coward

Stability of Oscillatory Two Phase Couette Flow

CAMS-002: D.T. Papageorgiou, G.C. Papanicolaou, and Y.S. Smyrlis

Modulational Stability of Periodic Solutions of the Kuramoto-Sivashinsky Equation

CAMS-003: Bruce Bukiet, William Peter, and Elliotte Harold

Maximum Projectile Velocity in an Augmented Railgun

CAMS-004: G.A. Kriegsmann and C.L. Scandrett

Decoupling Approximations Applied to an Infinite Array of Fluid Loaded Baffled Membranes

CAMS-005: Bonnie Ray, Shaw Chen, and Jeffrey Jarrett

Identifying Permanent and Temporary Components in Japanese Stock Prices

CAMS-006: Shaw Chen, Jeffrey Jarrett, and Bonnie Ray

Forecasting By Arima Methods: A Comparison of Integer and Fractionally Differenced Models

CAMS-007: André Nachbin

The Localization Length of Multiply-Scattered Water Waves

CAMS-008: G.A. Kriegsmann, I.D. Abrahams, and E.L. Reiss

Caustic Formation from a Point Source in a Shear Layer over an Elastic Surface: A Model for the Suppression of Coherent Fluid Structures

CAMS-009: G.A. Kriegsmann and J.H.C. Luke

Rapid Pulse Responses for Scattering Problems

CAMS-010: Demetrios T. Papageorgiou

Analytical Description of the Breakup of Liquid Jets in Air

CAMS-011: H.M. Lacker, H. Chaudhry, T.H. Choi, J.J. Kriegsmann, W. Boda, W.N. Tapp, S.A. Sisto

A Simple Mathematical Model of the Complete Walking Cycle with Applications to the Physically Disabled: Symmetric and Steady Periodic Solutions

CAMS-012: Sunil Dhar and Xulun Jiang

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

CAMS-013: Julian Cole and Barbara Wagner

On Self-Similar Solutions of Barenblatt's Nonlinear Filtration Equation

Julian Cole and Barbara Wagner

IX. EXTERNAL ACTIVITIES

Kriegsmann, Gregory A.

Chairman, Organizing Committee for the 1993 SIAM National Meeting

Organizing Committee, IMA Propagation on Wave Propagation, University of Minnesota.

Papageorgiou, Demetrius

Co-Organizer at the Society for Industrial and Applied Mathematics 1993 Annual Meeting, Philadelphia Minisymposium on *Two-Fluid flows and Interfacial Instabilities*

Porter, Michael

Associate Editor, Journal of the Acoustical Society of America

Reviewer of Navy Shallow Water Program, Naval Studies Board of the National Academy of Sciences