CONTENTS

I. FROM THE DIRECTOR

In 1994, CAMS continued to make significant strides in fulfilling its mission to promote and sustain research in the mathematical sciences at NJIT. A twenty percent growth over 1993 in the number of externally funded research projects (compounded with a fifty percent growth in 1993 over 1992) is a major indicator of the effectiveness of the support for research by CAMS. This support includes assistance with preparation and submission of research papers and proposals, the CAMS/Math Seminar Series, the CAMS/Math Computation Laboratory (including the recently implemented Video/Animation Facility), the CAMS Reading Room, the CAMS Reports, and the CAMS Summer Research Program. The hard work of many CAMS members and the support of NJIT have permitted the maintenance and development of this essential infrastructure. As we pause to take stock of the activities of the past year, I hope that the members of CAMS will share my sense of gratification in the fruits of these efforts.

Even as we take pleasure in our accomplishments, we observe that many important goals remain for the future. The implementation in 1994 of the the Ph.D. Program in the Mathematical Sciences provides an important opportunity to leverage our research efforts through our doctoral students. Taking advantage of this opportunity, however, will require generation of financial support for these students. Furthermore, the job market dictates that increased and strengthened contacts with industry are needed for the success of this doctoral program. The growing burden of publication activities including editorial work, CAMS Reports, journal papers, and electronic publication is pointing towards the need to develop support in this area (perhaps through a publication secretary). The growth in size and sophistication of the CAMS/Math Computation Laboratory suggests that professional systems administration, accountable to CAMS/Math Committee on Computation, should be sought. Our continued growth forces us to address our growing need for space in support of research activities, particularly common space and office space for visitors and guests. Finally, the participation of the members of CAMS in the projects sponsored through other centers, departments, and universities grew significantly in 1994. Since true applications of mathematics and statistics demand these interdisciplinary interactions, this trend must be viewed positively and must be strongly encouraged. At the same time, steps must be taken to assure that the support for these projects by CAMS and its members is properly recognized. I am confident that in the coming years CAMS, in cooperation with its partners and supporters at NJIT and through the efforts of its members, will meet these challenges.

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 Computation, and the Committee on Publications and 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 secures the appointment of 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 obtain 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
Bechtold, John
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**
Michalopoulou, Zoi-Heleni
Milojevic, Petronije
Nachbin, André
Papageorgiou, Demetrios
Perez, Manuel
Porter, Michael
Ray, Bonnie
Rosar, Madeleine
Sran, Kewal
Stickler, David
Tavantzis, John
Wagner, Barbara

Department of Mechanical & Industrial Engineering

Rosato, Anthony
Dave, Rajesh

Department of Civil & Environmental Engineering

Meegoda, Namunu

4

CAMS Research Professors

    Chaudhry, Hans
    Erneux, Thomas
    Findley, Thomas

Long-Term Visitors

Prykarpatskyj, Anatolij K.	Ukrainian Academy of Sciences L'viv, Ukraine
Samoilenko, Valerij	Ukrainian Academy of Science–Kiev, Ukraine
Basu, Sujit K.	Indian Institute of Management-Calcutta, India

Short-Term Visitors

Marchant, Timothy	University of Wollongong Australia
Smith, Paul D.	The University of Dundee Scotland, United Kingdom
Silberglitt, Richard	FM Technologies Fairfax, Virginia
Gartland, Charles	Kent State University Kent, Ohio
Edwards, David	The Courant Institute New York, NY
Villamizar, Vianey	University of Venezuela Caracas
Smyrlis, Yiorgos	University of Cyprus Greece

IV. SEMINARS AND WORKSHOPS

A. THE CAMS/MATH SEMINAR SERIES

Michael Renardy

Department of Mathematics, Virginia Polytechnic Institute

Surface-Tension Driven Breakup of Viscoelastic Jets

Jonathan Goodman

Courant Institute of Mathematical Sciences, New York University

Stability for Models of Unstable Front Motion

Kiat Chua

Continuum Dynamics, Princeton, New Jersey

Engineering and Scientific Computing at Continuum Dynamics, Inc.

Valeri Hr. Samoilenko

Department of Mathematical Physics and Theory of Nonlinear Oscillations, Institute of Mathematics, Ukrainian Academy of Sciences

Analysis of Complete Integrability of Inverse Korteweg-de Vries Equation by Means of Gradient-holonomic Algorithm

Robert G. Root

Department of Mathematics, Lafayette College

Modeling Strongly Anisotropic Elastic Plates Using Degenerate von Karman Equations

Hans Chaudhry

Kessler Institute for Rehabilitation and Department of Mathematics, NJIT

The Effect of Residual Stresses on Wave Speed in Arteries

Charles Gartland

Department of Mathematics and Computer Science, Kent State University

Numerical Minimization of the Landau-Degennes Free Energy for Liquid Crystals

Philip Hall

Department of Mathematics, Manchester University, United Kingdom

Phase Equations: A New Approach to Strongly Nonlinear Shear Flow Instabilities

John Chambers

Data Analysis Research Department, AT&T Bell Laboratories

Recent Research in Statistical Computing at AT&T Bell Laboratories

Tetsuji Ueda

Princeton University

Paraxial Waves in Elliptic Media for Self-focussed Optical Beam Propagation

Ashwani Kapila

Department of Mathematical Sciences, Rensselaer Polytechnic Institute

Detonations: Their Birth, Propagation and Death

Robert Krasny

University of Michigan and Institute of Advanced Studies

A Numerical Method for Vortex Sheet Separation at a Sharp Edge

Philip Goode

Department of Physics, New Jersey Institute of Technology

The Solar Neutrino Shortage-Whose Problem Is It?

Steve Piacsek

Naval Research Laboratory, Stennis Space Center

High Resolution Barotropic Modeling of the Mediterranean on the CM5

Cathleen Morawetz

Courant Institute of Mathematical Sciences, New York University

Shock Reflections

Sujit K. Basu

Indian Institute of Management, Calcutta, India

An Optimum Ordering Policy in a Two-Supplier Inventory Model with Uncertain Supplies

Madeleine E. Rosar

Philips Laboratories, Briarcliff Manor, New York

A Three-Dimensional Computer Model for Fluid Flow Through a Collapsible Tube

Timothy Marchant

University of Wollongong, Australia

The Prediction of Thermal Runaway in Microwave Heated Materials

John Bechtold

Department of Mathematics, New Jersey Institute of Technology

Thermal Ignition in Supersonic Boundary Layers

Nalini Ravishankar

Department of Mathematics, University of Connecticut, Storrs

Bayesian Analysis of Autoregressive Fractionally Integrated Moving Average Processes

Jonathan Luke

Department of Mathematics and CAMS, New Jersey Institute of Technology

Numerical Methods for Dispersive Wave Equations

M.A. Efendiev

Mathematisches Institut A, University of Stuttgart, Germany

Degree Theory and Problems of Hydrodynamics

Howard M. Taylor

Department of Mathematical Sciences, University of Delaware

On the Current Enhancement at the Edge of a Crack in a Lattice of Resistors

Vinh That Ton

Courant Institute of Mathematical Science, New York University

Numerical Simulations of High-Speed Chemically Reacting Flow

P.K. Sen

School of Business Administration, SUNY, Buffalo

Legal Liabilities, Accuracy and Fees and the Market for Audit Services

Alfred Grey

Department of Mathematics University of Maryland, College Park, Maryland

Nineteen Century Surfaces

Marco Avellandeda

Courant Institute for Mathematical Sciences, New York University

Valuation and Dynamical Hedging of Derivative Securities in the Presence of Transaction Costs: Binomial and Lognormal Models

Robert Cox

Medical School of Wisconsin

Magnetic Resonance Imaging and Human Brain Function: Physics, Physiology, and Signal Processing

G.S. Triantafyllou

The Benjamin Levich Institute for PhysicoChemical Hydrodynamics, City College of New York

Absolute Instability in Non-Dissipative Systems

Michael Porter

Department of Mathematics, New Jersey Institute of Technology

Mathematical and Computational Problems in Ocean Acoustics

Regina Y. Liu

Department of Statistics, Rutgers University, Newark

Nonparametric Multivariate Inference Based on the Concept of Data Depth

Vojislav Maric

University of Novi Sad, Yugoslavia

Some Results on Asymptotics of Nonoscillatory Solutions of Second Order Linear Equation (Radially Symmetric Schrodinger Equation

Dimitrios M. Tsangaris

Center for Environmental Engineering and Science, NJIT

Molecular Computer Simulations and Thermodynamic Properties of Fluids

Tzong Yow Lee

Department of Mathematics, University of Maryland

Wave Front Propagation in some Reaction-Diffusion Equations

B. CAMS WORKSHOPS ON MATHEMATICAL PROBLEMS AT NJIT

NONLINEAR DYNAMICAL SYSTEMS

Denis Blackmore, Department of Mathematics and CAMS, NJIT
Analoly Prykarpatsky, Ukrainian Academy of Sciences, Kiev, Ukraine

V. CAMS SUMMER RESEARCH PROGRAM FOR STUDENTS

The CAMS Summer Research Program for Students provides administrative support for faculty working with students on research projects during the summer. This support includes the organization of the CAMS Graduate Research Seminar where faculty and students present their research projects or other topics of interest.

A. PARTICIPANTS

Student	Project Advisor
John Gilchrist	Demetrius Papageorgiou
Juan Gomez	Michael Booty
Zili Huang	Demetrius Papageorgiou
Peiwen Hou	Jonathan Luke
Xulun Jiang	Michael Lacker
Shalesh Naire	Bruce Bukiet
Andre Pajak	Denis Blackmore
John Pelesko	Gregory A. Kriegsmann
Susan Schenk	Michael Lacker

B. CAMS GRADUATE RESEARCH SEMINAR

Organizer: Jonathan Luke

Gregory Kriegsmann
Applied Mathematical Problems in Wave Propagation
Michael Booty
Some Problems in Combustion Theory
Michael Porter
How to Give a Truly Terrible Talk
Demetrius Papageorgiou
Break-up of Liquid Jets
John Pelesko
Improved Estimation of the Heat Transfer Characteristics of a Power Condenser
Michael Lacker
A Postmortem Exam
John Gilchrist
Microwave Heating of a Fluid Slab and Hydrodynamic Stability
Xulun Jiang
Susan Schenk
A Relaxation Method for Solving a Model of Human Gait
Juan Gomez
Spherical Diffusion Flames
Peiwen Hou
Numerial Solution of $u_t + u_x + \lambda u = 0$

VI. EXTERNALLY SPONSORED RESEARCH

A. NEW PROJECTS (Beginning in 1994)

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

    Department of Energy: June 1994 - May 1997

    Gregory A. Kriegsmann

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

    National Science Foundation: July 1994 - June 1997

    Michael Booty

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

    National Science Foundation: July 1994 - January 1996

    Bonnie K. Ray

4. *Broadband Localization*

    Naval Undersea Warfare Center: April 1994 - December 1994

    Michael Porter

5. *Mathematical Sciences Computing Research Environments*

    National Science Foundation: August, 1994 - July, 1995

    Jonathan Luke
    Michael Booty
    Cheryl Hile
    Michael Lacker
    André Nachbin

6. *Mathematical Problems in Modern Electrodynamics*

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

    Gregory A. Kriegsmann
    Cheryl Hile
    Jonathan Luke

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

    National Science Foundation: June 1994 - May 1997

    D.T. Papageorgiou

B. CONTINUING PROJECTS (Beginning before 1994)

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

   National Science Foundation: June 1993 - May 1996

   > Thomas Erneux

2. *Mathematical Methods in Applied Wave Propagation*

   Office of Naval Research: October 1992 - September 1994

   > Gregory A. Kriegsmann
   > Michael Porter

3. *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, France

4. *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

5. *Applied Mathematical Problems in Modern Electromagnetics*

   Air Force Office of Scientific Research: June 1993 - May 1997

   > Gregory A. Kriegsmann

6. *Mathematical Sciences Computing Research Environments*

   National Science Foundation: September 1993 - February 1995

   > Jonathan Luke
   > Rose Dios
   > Sunil Dhar
   > Bonnie Ray

7. *Microwave Processing of Ceramic Materials*

   National Science Foundation: August 1993 - January 1996

   > Gregory A. Kriegsmann
   > Barbara Wagner

8. *Student Support Grant, REAP Program*

   NAFSA: August 1993 - June 1994

   Roman Andrushkiw

9. *Rapid 3D Focalization*

   Naval Research Laboratory: September 1993 - September 1994

   Michael Porter

10. *Collaborative Research Grant, CAST Program*

   National Research Council: October 1993 - July 1994

   Roman Andrushkiw
   Valeri Samoilenko - Ukrainian Academy of Sciences, Kiev, Ukraine
   Anatoly Prykarpatsky - Ukrainian Academy of Sciences, L'viv, Ukraine

11. *Intergovernmental Assignment*

   National Science Foundation: August 1993 - August 1995

   Daljit S. Ahluwalia

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, CUNY

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

   Air Force Office for Scientific Research: April 1993 - April 1997

   D.T. Papageorgiou

3. *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

4. *Ultrasonic Soil Washing*

   Environmental Protection Agency: November 1994 - August 1995

      M.C. Bhattacharjee
      Namunu Meegoda, Department of Civil Engineering
      Wenpin Dustin Ho, HSMRC

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

   Proctor and Gamble Company: March 1994 - March 1997

      Michael Booty
      Joseph Bozzelli, Department of Chemistry and Chemical Engineering
      Lev Krasnoperov, Department of Chemistry and Chemical Engineering

6. *Particulate Technology in Manufacturing Processes*

   National Science Foundation: June 1994 - December 1996

      Robert Pfeffer, Department of Chemistry and Chemical Engineering
      Jonathan Luke
      Anthony Rosato, Department of Mechanical Engineering
      Rajesh Dave, Department of Mechanical Engineering
      Ian Fisher, Department of Mechanical Engineering

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

   National Aeronautics & Space Administration: August 1993 - September 1995

      D.T. Papageorgiou
      Charles Maldarelli, Levich Institute, CUNY

8. *A Model Approach to Task Intervention: An Exploratory Study of Human Gait*

   Kessler Institute for Rehabilitation: March 1994 - March 1996

      Michael M. Lacker

VII. PROPOSED RESEARCH

A. CAMS PROPOSALS

1. *Asymptotic and Numerical Studies of Nonlinear Optical Pulse Propagation*

   National Science Foundation

   Cheryl Hile

2. *Solvability of Strong Nonlinear Operator Equation and Application to Elliptic and Hyperbolic Equation*

   National Science Foundation

   P. Milojevic

3. *Signal Processing for Marine Mammal Localization and Deconvolution of Biological Acoustic Transients*

   National Science Foundation

   Z.E. Michalopoulou

4. *On Self-similar Solution of the Second Kind*

   National Science Foundation

   B. Wagner

5. *Fluid Flow in Elastic Tube*

   National Science Foundation

   M. Rosar

6. *Mathematical Modeling and Dynamics of Premixed Flames as Hydrodynamic Discontinuities*

   National Science Foundation

   J. Bechtold

7. *Mathematic Studies for Wave Propagation*

   National Science Foundation

   C. Hile

8. *Shallow Water Broadband Detection and Localization*

   Office of Navel Research

   M. Porter

9. *Modeling Curved Detonations*

   Department of Energy

   B. Bukiet

10. *Swept Volume Dynamical Systems via Diff.-Geo and Lie-Alg. Bivariance*

    NAS/NRC

    D. Blackmore

11. *The Investigation of Nonlinear Phenomena in Dissipative Systems and Their Mathematical Modeling*

    NAS/NRC

    R. Andrushkiw
    V. Gafiydnik

12. *Mathematical Sciences Computing Research Environments*

    National Science Foundation

    Jonathan Luke
    Gregory A. Kriegsmann
    Madeleine Rosar
    Rober Barat, Department of Chemical Engineering
    Bruce Bukiet
    John Bechtold
    Demetrius Papageorgiou
    Zoe-Heleni Michalopoulou

13. *Mathematical Sciences Computing Research Environments*

    National Science Foundation

    Jonathan Luke
    Vladislav Goldberg
    Petronije Milojevic
    Barbara Wagner
    Roman Andrushkiw

14. *Matched Field Processing*

> NATO International Scientific Exchange Program Collaborative Research Grant

>> Michael Porter
>> Zoi-Heleni Michalopoulou
>> Donald Gingras-SACLANT Undersea Research Centre, Italy

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

> National Science Foundation

>> Denis Blackmore

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. *Plastics Combustion Data*

   American Plastics Council

   Michael Booty
   Richard Magee, HSMRC
   Joseph Bozzelli, Department of Chemical Engineering
   Len Krasnopern

7. *Training Industry for Performing Calculation in Equilibrium and Detailed Reaction Kinetics Simulations for Combustions and Incineration Processes*

   US Environmental Protection Agency

   Michael Booty
   J. Bozzelli

8. *The Effect of Surfactants on Thermocapillary Migration at Arbitrary Reynolds Numbers*

   National Aeronautics & Space Administration

   D.T. Papageorgiou

9. *Statistical Analysis of New Jersey Traffic Monitoring Procedures*

   New Jersey Division of Transportation

   Manish Bhattacharjee

10. *Motion Analysis Performance Systems*

    St. Joseph's Medical Center

    Michael M. Lacker

11. *Prognosis and Treatment of the Meniscus: A Comparative Study*

    Kessler Institute for Rehabilitation

    Michael M. Lacker

VIII. FACILITIES

A. CAMS/MATH COMPUTATION LABORATORY

Committee on Computation:

Manuel Perez, Co-Chairperson
Michael Porter, Co-Chairperson
Cheryl Hile
Demetrius Papageorgiou

Laboratory Assistant:

Evangelos Tsimis

The addition of new equipment in the CAMS/Math Computational Laboratory as well as in individual offices has increased significantly the systems administration work load. The lab assistants, Nicholas Antoniou and Evangelos Tsimis, have done a tremendous job in keeping things running smoothly and efficiently.

The major new addition to the Lab was provided by a NSF equipment grant awarded to Professors Booty, Hile, Lacker and Luke. This award has added a new dimension to our computational capabilities since it was used to purchase a dedicated graphics server (Silicon Graphics Indigo2 Extreme Graphics). Moviemaking software was also purchased, including Wavefront Composer, Teckplot and MATLAB. Besides its state-of-the art graphics capabilities the new machine has helped relieve the CPU overload that often occurs.

Several HP 715/33 workstations were also purchased for use by new faculty. These machines have been fully integrated into the network and are running all the software and compiler programs, either locally or by accessing the servers.

Various peripherals were also purchased to meet the needs of storage and memory. In addition the S-Plus statistical package was bought and installed on the Hewlett Packard unix server.

We have been also upgrading the PC equipment in the Lab. A Pentium 90 PC was purchased and integrated into the network. This machine is configured with the PC/TV Plus output to a TV as well as the necessary networking cards.

During 1994 the volume of computational needs has increased (and is still increasing) and so a system of backups has been adopted whereby all workstations are backed up twice a week. Once more, much of credit goes to the current Lab assistant, Evangelos Tsimis.

B. CAMS READING ROOM

Committee on Research Facilities:

Bonnie Ray

The CAMS Reading Room, located in Cullimore 607, continues to serve as a depository for research texts, journals, preprints and reprints of articles by CAMS members, software manuals, and funding information. Several new books and software manuals were added to the Reading Room collection during the year.

Throughout the fall and spring semesters, bimonthly CAMS teas were held in the reading room to provide CAMS members with a place to discuss research ideas in an informal setting.

As of September, 1995, CAMS Reading Room information will be available via the World Wide Web at http://chaos.njit.edu/CAMS/cams.html.

IX. PUBLICATIONS AND PRESENTATIONS

A. PUBLICATIONS

Andrushkiw, Roman

Algebraic Structure of the Gradient-Holonomic Algorithm for Lax-integrable Nonlinear Dynamical Systems, (with A.K. Prykarpatsky, V.Hr. Samoilenko, Yu. O. Mitropolsky, M.M. Prytula), Journal of Mathematical Physics, Vol. 35, pp. 1763-1777 and pp. 2237-2265, 1994.

Geometric Quantization of Neumann-type Completely Integrable Hamiltonian Systems, (with I.V. Mykytiuk, A.K. Prykarpatsky, V.Hr. Samoilenlo), Journal of Mathematical Physics, Vol. 35, pp. 1532-1548, 1994.

Two boundary model for freezing processes in living tissue, (with V.G. Gafiychuk and I. Lubashevskii), Proc. 14th IMACS World Congress on Computational and Applied Mathematics, 2 (1994) 546-548.

Bhattacharjee, Manish

Repair Relative Aging, Proceedings of the International Conference on Reliability and Quality in Design, H. Phan Editor. ISBN 0-9639998-0-X International Society Science & Applied Technologies, pp. 52-58, 1994

Aging Influenced by Repair, Efficiency and Realizability of a Renewal Related Distribution. International Journal of Reliability, Quality & Safety Engineering, 1(2), pp. 147-159, 1994.

Blackmore, Denis

Simple Dynamical Models for Vortex Breakdown of the B-type, Acta Mechanica, Vol. 102 pp. 91-101, 1994.

Analysis and Modelling of Deformed Swept Volumes, Computer-Aided Design, (with M.C. Leu and F. Shik), Vol., 26 pp. 315-326, 1994.

The Flow Approach to CAD/CAM Modeling of Swept Volumes, (with H. Jiang and M.C. Leu), Advances in Manufacturings Systems: Design, Modeling and Analysis, R.S. Sodhi, ed., pp. 341-346, 1994.

Application of Sweep differential Equation Approach to Nonholonomic Motion Planning, (with Z. Deng and M.C. Leu) Proceedings of the 1994 Japan-USA Symposium on Flexible Automation, pp. 1025-1034, 1994.

Improved Flow Approach for Swept Volumes, (with D. Qin and M.C. Leu) Proceedings of the 1994 Japan-USA Symposium on Flexible Automation, pp. 1191-1198, 1994.

Error Analysis of Surface Fitting for Swept Volumes, (with V. Gaddipati and F. Shik) Proceedings of the 1994 Japan-USA Symposium on Flexible Automation, pp. 733-738.

Further Developments of the SDE Approach, (with M.C. Leu) NSF Design and Manufacturing Grantees Conference, pp. 63-64, 1994.

Booty, Michael

Microwave Heating and Joining of Ceramic Cylinders: A Mathematical Model, (with G.A. Kriegsmann), Methods and Applications of Analysis, Vol. 1 No.4, pp. 403-414, 1994.

Bukiet, Bruce

Maximum Projectile Velocity in an Augmented Railgun, (with E. Harold and W. Peter), IEEE Transaction on Magnetics, Vol. 30, No. 4, July, 1994.

Chaudhry, Hans R.

Rotation of a Right Circular Core About its Axis, International Journal of NonLinear Mechanics, Vol. 29 No. 2, pp. 139-143, 1994.

Goldberg, Vladislav

Gerrit Bol (1906-1989) and his Contribution to Web Geometry, Webs and Quasigroups, Tver State University, Tver, pp. 4-15, 1994.

Maks Aizikovich Akivis (on the occasion of his 70th birthday and 50 years of scientific activity) (with A.T. Fomenko, V.V. Goldberg, V.F. Kirichenko, V.V. Ryzhkov, and A.M. Shelekhov), Russian Math. Surveys, Vol. 48 no. 3 (291), pp. 219-223, 1994.

Review of the Book Elements of the Theory of Three-Component Distributions of a Projective Space by Yu.I. Popov, St. Petersburg, Gos. University, St. Petersburg, 1992, p. 172. Mathematical Reviews, review 94g:53007, July, 1994

Review of the book Algebra and Geometry of Multidimensional Three-Webs, by M.A. Akivis and A.M. Shelekhov, Kluwer Academic Publications Dordrecht etc., 1992, pp.xvii+358 Zentralblatt fur Mathematik, vol. 771 (review 771:53001), pp. 212-213, 1994.

Hile, Cheryl

Pulse Propagation in Nonlinear Optical Fiber Lines that Employ Phase-sensitive Parametric Amplifiers, (with J.N. Kutz, W.L. Kath, R.D. Li, and P. Kumar), Journal. of the Optical. Society of America B, Vol. 11, No. 10, pp. 2112-2123, 1994.

Kriegsmann, Gregory A.

Sound Radiation and Caustic Formation from a Point Source in a Wall Shear, (with I.D. Abrahams and E.L. Reiss) Journal of AIAA, Vol. 32, No. 6, pp. 1135-1144, 1994.

Decoupling Approximations Applied to an Infinite Array of Fluid Loaded Baffled Membranes, (with C.L. Scandrett), Journal of Computational Physics, Vol. 111, No. 2, pp. 282-290, 1994.

Rapid Pulse Responses for Scattering Problems, (with J.H.C. Luke), Journal of Computational Physics, Vol. 111, No. 2, pp. 390-398, 1994.

Microwave Heating and Joining of Ceramic Cylinders: A Mathematical Model, (with M.R. Booty), Methods and Applications of Analysis, Vol. 1 No. 4, pp. 403-414, 1994.

Microwave Heating of Carbon Coated Ceramic Fibers, (with B.A. Wagner), IMA Journal of Applied Mathematics, pp. 473-478, 1994.

Luke, Jonathan

Rapid Pulse Responses for Scattering Problems, (with G.A. Kreigsmann), Journal of Computational Physics, Vol. 111, No. 2, pp. 390-398, 1994.

Milojevic, P.S.

Fourier Analysis, Analytic and Geometric Aspects Notes in Pure and Applied Mathematics, (co-editor), Vol.157, Marcel Dekker, NY 1994.

Approximation-Solvability of Nonlinear Equations and Applications, Fourier Analysis, (co-editors: W. Boray, C. Stauojevic), Lecture Notes in Pure and Applied Mathematics, Marcel Dekker, vol. 157 pp. 311-373, 1994.

Papageorgiou, Demetrius

Stability of Oscillatory Two-Phase Couette Flow, (with A.V. Coward), IMA Journal of Applied Mathematics Vol. 53, pp. 75-93., 1994

Nonlinear Stability of Oscillatory Core-annular Flow: A Generalized Kuramoto-Sivashinsky Equation with Time-Periodic Coefficient, ICASE Report, 1994.

Porter, Michael

Finite-Element Ray Tracing, (with Yong-Chun Liu), Proceeding of the International Conference on Theoretical and Computational Acoustics, Eds. D. Lee and M.H. Schultz, World Scientific, 1994.

Acoustic Models and Sonar Systems, IEEE Journal of Oceanic Engineering (special issue on Sonar System Technology), Vol. OE-18 (4) pp. 425-437, 1994.

Adiabatic Modes for Translationally-Invariant Oceans, Journal of the Acoustical Society of America, Vol. 96 (3), 1994.

The Matched-Field Processing Benchmark Problems, Journal of Computational Acoustics, Special Issue on benchmarking matched-field processing methods, 2 (3) pp. 161-185, 1994.

Full-field Inversion of the Ocean Structure, Proceeding of the Second European Conference on Underwater Acoustics, Eds. L. Bjorno, European Commission, Luxembourg, 1994.

Computational Ocean Acoustics (with F. Jensen and W. Kuperman), American Institute of Physics, New York (1994).

Surface duct propagation and the ocean mixed layer (with S. Piacsek, L. Henderson and F. Jensen) in **Coupled Ocean Prediction and Acoustic Propagation Models**, eds. A. Robinson and D. Lee, Amerian Institute of Physics, New York (1994).

Ray, Bonnie

Estimation of the Memory Parameter for Nonstationary or Noninvertible Fractionally Integrated Processes, (with C. Hurvich), Journal of Time Series Analysis, Vol. 16, pp. 17-42., 1994.

An Inference Structure for Process Feedback: Techniques and Implementation, (with I. Bhandari et al.), Software Quality Journal, Vol. 3, pp. 167-189.

Wagner, Barbara

Microwave Heating of Carbon Coated Ceramic Fibers, (with G.A.Kriegsmann), IMA Journal of Applied Mathematics, pp. 473-478, 1994.

B. PRESENTATIONS

Andrushkiw, Roman

July 1994: 14th IMACS World Congress on Computational and Applied Mathematics, Atlanta
Two Boundary Model for Freezing Processes in Living Tissue

Bhattacharjee, Manish

December 1994: Triennial Symposium in Probability and Statistics, Calcutta University, India
Tests for a Property of Aging Under Renewals: Rationality and Asymptotics

December 1994: International Workshop on Censored Data Analysis (Sponsored by NSF), University of Poona, India
On Kolmogorov-Smirnov Type Tests for NB(W)UE Alternatives Under Some Censoring Schemes

Blackmore, Denis

January 1994: 1994 NJF Design and Manufacturing Systems Grantees Conference, Cambridge, Massachusetts
Further Developments of the SDE Approach

July 1994: 1994 Japan-USA Symposium on Flexible Automation, Kobe, Japan
Improved Flow Approach for Swept Volumes

July 1994: 1994 Japan-USA Symposium on Flexible Automation, Kobe, Japan
Error Analysis of Surface Fitting for Swept Volumes

November 1994: Graduate Seminar, Department of Civil and Environmental Engineering, NJIT, Newark, NJ
Chaos Theory with Engineering Applications

Booty, Michael

July 1994: Society for Industrial and Applied Mathematics, San Diego, CA
The Slow-Time Evolution of Fast Flames

July 1994: Combustion Institute, The 25th International Symposium on Combustion, Irvine, CA
Modulation of a Subsonic Premixed Deflagration

Bukiet, Bruce

March 1994: Family Mathematics Program (Millburn Public School)
What Mathematicians Do: The Mathematics of Detonations

June 1994: Fifth International Conference on Hyperbolic Problems: Theory,
Numerics and Applications, University at Stony Brook, Stony Brook, NY
The Effect of a Non-Zero Shock Width on Wave Propagation in Two Dimensions

Chaudhry, Hans R.

January 1994: Indian Institute of Technology, New Delhi, India
The Mathematical Modeling of Amputee Gait

March 1994: University of Medicine and Dentistry, Newark, NJ
The Effect of Residual Stresses on Wave Speed in Arteries

Goldberg, Vladislav V.

February 1994: International Conference on Differential Geometry, Hamiltonian Systems and Operator Theory, University of West Indies, Mona, Kingston,
Jamaica
Normal Connections of a Submanifold of a Projective Space

August 1994: Conference on History of Mathematics in Honor of Boris Rosenfeld, Penn State University
Gerrit Bol (1906-1989) and his Contribution to Web Geometry

Hile, Cheryl

January 1994: AFOSR Electromagnetics Workshop, San Antonio, TX,
Numerical Solutions of Maxwell's Equations

July 1994: SIAM Annual Meeting, San Diego, CA
Asymptotic and Numerical Solutions of Maxwell's Equations for Nonlinear Optical Pulse Propagation

Kriegsmann, Gregory A.

January 1994: Air Force School of Aerospace Medicine, San Antonio, TX
A Hybrid Method for Large Electromagnetic Gratings

March 1994: Department of Mathematics, University of Akron, OH
Mathematical Problems in Microwave Heating

April 1994: Department of Mathematics, University of Virginia, Charlottesville, VA
Mathematical Problems in Microwave Heating

April 1994: Material Research Society Meeting, San Francisco, CA
Hot Spot Stabilization Mechanisms

April 1994: ACES Conference, Monterey, CA
Rapid Pulse Responses for Scattering Problems

April 1994: First International Meeting on Mathematics and Computing in Medicine, Austin, TX
Microwave Heating of Biological Tissue

September 1994: Institute for Mathematics and Applications, Minneapolis, MN
Nonlinear Problems in Microwave Processing of Material

October 1994: University of Arizona, Tuscon, AZ
Nonlinear Problems in Microwave Processing of Materials

December 1994: Textron Specialty Materials, Lowell, MA
Microwave Heating of Fibers

December 1994: Engineering Science and Applied Mathematics Department, Northwestern University, Evanston, IL
Cavity Effects in Microwave Heating of Materials

Luke, Jonathan

January 1994: Air Force Electromagnetics Workshop, San Antonio, TX
A Hybrid Method for Propagation of Ultra-Sharp Pulses in Dispersive Media

September 1994: NJIT CAMS/Math Seminar Series
Numerical Methods for Dispersive Waves Equations

Michalopoulou, Zoi-Heleni

July 1994: 2nd European Conference on Underwater Acoustics, Copenhagen, Denmark
On Acoustic Seafloor Characterization

November 1994: 128th Meeting of the Acoustical Society of America, Austin
Exploiting Source Dynamics in Matched-field Processing

December 1994: 5th Matched-Field Processing Workshop, Victoria, Canada
1. *Matched-field processing for the Gulf-of Mexico Experiment*
2. *The Hudson Canyon Experiment*

Papageorgiou, Demetrius

June 1994: Canadian Applied Mathematics Society, International Congress, Edmonton, Canada, (invited speaker with P. Hall)
Breakup of liquid jets

July 1994: International Conference on Nonlinear Dynamics and Pattern Formation in the Natural Environment, Noordwijkerhout, The Netherlands
Breakup of liquid jets

November 1994: American Physical Society, Annual Meeting, Fluid Dynamics Division, Atlanta, Georgia
Breakup of liquid jets

Porter, Michael

July 1994: 2nd European Conference on Underwater Acoustics, Copenhagen, Denmark
Full-field inversion of the ocean structure

June 1994: ASA Meeting, Cambridge, MA
1. *Assimilation of acoustic data into oceanographic models*
2. *Source tracking in the Hudson Canyon experiment*
3. *Sound in the Ocean: a short video*
4. *Array shading for matched-field processing*

June 1994: Full Field Inversion Methods in Ocean and Seismic Acoustics, LaSpezia, Italy
Mode Validation for Direct and Inverse Problems

August 1994: Research Workshop at Scripps (Marine Physical Laboratory)
A Benchbark for Long-Range Pulse Propagation

November 1994: 128th Meeting of the Acoustical Society of America, Austin
ASA Short Course on Matched-Field Processing

December 1994: 5th Matched Field Processing Workshop, Victoria, BC Canada
1. *Matched-field processing for the Gulf-of Mexico Experiment*
2. *The Hudson Canyon Experiment*

Ray, Bonnie

September 1994: NBER/NSF Time Series Workshop, Ft.Collins, CO, (invited paper with P.A.W. Lewis)
Long-term Dependence, Nonlinearity, and Periodic Phenomena in Sea Surface Temperatures

June 1994: IMS/Bernoulli Society World Congress, Chapel Hill, NC
Estimation of the Memory Parameter for Nonstationary or Noninvertible Fractionally Integrated

C. CAMS REPORTS

CAMS-014: Clifford M. Hurvichdvips and Bonnie Ray

Estimation of the Memory Parameter for Nonstationary or Noninvertible Fractionally Integrated Processes

CAMS-015: Cheryl V. Hile, Ruo-Ding Li and Prem Kumar

Pulse Propagation in Nonlinear Fiber-Lines That Employ Phase-Sensitive Parametric Amplifiers

CAMS-016: P.S. Milojevic

Solvability of Strongly Nonlinear Operator Equations and Applications

CAMS-017: P.S. Milojevic

Approximation - Solvability of Nonlinear Equations and Applications

CAMS-020: Demetrios T. Papageorgiou and Oscar Orellana

Pinching Solutions of Slender Cylindrical Jets

CAMS-021: Manish C. Bhattacharjee

Aging Influenced by Repair, Repair Efficiency and Realization of a Renewal Related Distribution

CAMS-022: André Nachbin

The Roll-Up and Self-Intersection of a Dissipative Vortex Sheet

CAMS-023: A.K. Prykarpatskyj, V.Hr. Samoilenko, and R.I. Andrushkiw

Algebraic Structure of the Gradient-Holonomic Algorithm for Lax Integrable Nonlinear Dynamical Systems. II. The Reduction via Dirac and Canonical Quantization Procedure

CAMS-024: A.K. Prykarpatsky, V.Hr. Samoilenko, R.I. Andrushkiw, Yu.O., Mitropolsky, M.M. Prytula

Algebraic Structure of the Gradient-Holonomic Algorithm Lax Integrable Nonlinear Systems. I.

CAMS-025: Michael B. Porter

A Benchmark Problem for Lone-Range Pulse Propagation

CAMS-026: M.C. Bhattacharjee, S.K. Basu, M. Mitra

On Some Properties of the L-Class of Life Distributions

CAMS-027: M.C. Bhattacharjee, A.M. Abouammoh, A.N. Ahmed, and A.M. Barry

Preservation of Aging Properties Based on Comparisons with Asymptotic Remaining Life Under Renewals

CAMS-028: D.T. Papageorgiou, Y.S. Smyrils, and A.V. Coward

Nonlinear Stability of Oscillatory Core-Annular Flow: A Generalized Kuramoto-Sivashinsky Equation with Time Periodic Coefficients

CAMS-029: M.C. Bhattacharjee and S.K. Basu

"Residual Life Time at Great Age" Revisited

CAMS-030: M.C. Bhattacharjee and S.K. Basu

Ageing with Laplace Order Conserving Survival Under Perfect Repair

CAMS-031: Cheryl V. Hile and William L. Kath

Numerical Solutions of Maxwell's Equations for Nonlinear Optical Pulse Propagation

CAMS-032: M.C. Bhattacharjee

Stochastic Comparisons and Bounds for Aging Renewal Process Shock Models and Their Applications

CAMS-033: Sunil K. Dhar and Xulun Jiang

An in Depth Look at a Popular Procedure for Collecting Sensitive Information

CAMS-034: P.S. Milojevic

On the Dimension and the Index of the Solution Set of Nonlinear Equations

CAMS-035: B. Bukiet, J. Pelesko, X.L. Li, P.L. Sachdev

A Characteristic Based Numerical Method with Tracking for Nonlinear Wave Equations

CAMS-036: B. Bukiet, E. Harold, J.L. Palacios

A Markov Chain Approach to Baseball

CAMS-037: H.R. Chaudhry, B. Bukiet, M. Lacker

The Effect of Residual Stresses on Wave Speed in Arteries

CAMS-038: B. Bukiet, R. Menikoff, K.S. Lackner

Modeling Flows with Curved Detonation Waves

CAMS-039: H.R. Chaudhry, B. Bukiet, A.M. Davis

Stresses and Strains in the Left Ventricular Wall Approximated as a Thick Conical Shell Using Large Deformation Theory

CAMS-040: H.R. Chaudhry, B. Bukiet, T. Regan

Dynamic Stresses and Strains in the Left Ventricular Wall Based on Large Deformation

CAMS-041: H.R. Chaudhry, B. Bukiet, T. Findley

The Effect of Residual Stresses in the Left Ventricle

CAMS-042: Bruce Bukiet and Rajesh Dave

Non-Intrusive Rigid Body Tracking Technique for Dry Particulate Flows, Part I: Theoretical Aspects

CAMS-043: Demetrios T. Papageorgiou

On the Breakup of Liquid Threads

CAMS-044: Demetrios T. Papageorgiou

On the Breakup of Viscous Liquid Threads

X. EXTERNAL ACTIVITIES

Kriegsmann, Gregory A.

Organizer and participant, Institute for Mathematics and Its Applications (IMA) Program on Wave Propagation (Fall 1994)

Editorial Board, Journal of Engineering Mathematics

Editorial Board, Journal of Electromagnetic Waves and Applications

Member, Organizing Committee for the 1994 SIAM National Meeting

Member, Organizing Committee for the 3rd International Conference on Mathematical and Numerical Aspects of Wave Phenomena

Lacker, Michael

Editorial Board, Journal of Theoretical Biology

Milojevic, Petronije

Editorial Board, Communications on Applied Nonlinear Analysis

Papageorgiou, Demetrius

NASA Group Achievement Award, ICASE, Langley Research Center

Porter, Michael

Associate Editor, Journal of the Acoustical Society of America

Member of the National Academy of Sciences Navy Studies Board: Review in detail the Navy's Shallow Water Program

Organizing Committee, Seminar on Ray and Beam Methods for the International Conference on Theoretical and Computational Acoustics

Organizing Committee, SIAM minisymposium on Computational Ocean Acoustics

Organizing Committee, Workshop on Acoustic Models in Signal Processing, Naval Research Laboratory

Ray, Bonnie

Editorial Board, Business and Management Forecasting