Department of Applied Mathematics

Annual Report
2000 - 2001

University of Colorado at Boulder

Boulder, Colorado 80309-0526

Harvey Segur, Chair
July 1, 2001

Sheared Fluid Flow... Matthew Tearle, APPM Graduate Student

TABLE OF CONTENTS

TABLE OF CONTENTS

OVERVIEW

2000-2001 was a transitional year for the Department of Applied Mathematics, with major changes in personnel, and with more gradual changes in the way the Department carries out its mission.

The most important change occurred one year ago, when Mark Ablowitz stepped down as Department Chairman, and Harvey Segur assumed that role. Mark moved to Colorado in 1989 in order to create a new Program in Applied Mathematics. These Annual Reports have documented how well he has carried out that charge. The Program in Applied Mathematics began in 1989-1990 with four tenured or tenure-track faculty, one post-doctoral instructor, a staff of one, and no graduate students. The Program became the Department of Applied Mathematics in 1996. In 2000-2001, the department had 14 tenured or tenure-track faculty, 9 post-doctoral instructors, 7 research associates, a staff of 7 (some full-time, some part-time), and 61 graduate students. Mark's high standards have been an inspiration and a challenge to the rest of us. Thank you, Mark, for all that you have done for this department.

Also one year ago, James Curry stepped down as Associate Chair, and was replaced by Anne Dougherty. James' resignation as Associate Chair freed him to carry out new projects that he had been quietly formulating while he arranged course schedules and advised students, as other parts of this report document. His service to the University may even have increased since he stepped down. This department owes continuing thanks to James for his many contributions. Anne is particularly grateful for the help and guidance that James has provided throughout the transition.

During this year, we were pleased to welcome Jem Corcoran as a new Assistant Professor, and we bid farewell to Professor Bob Easton, who retires after 28 years at CU. (See §2J for more information about changes in personnel.)

Meanwhile, the department has been gradually changing how it carries out its mission. An important part of our departmental mission has always been to help others to apply mathematics to their needs. (See "Role and Mission" in §1.) As the needs of society and of the University change, this department must also change in order to carry out that goal effectively.

One set of changes began two years ago with an NSF grant called VIGRE (Vertical Integration in Research and Education). The grant has brought more post-doctoral researchers and instructors into the department, with a corresponding increase in level of activity and research. In addition, several of our undergraduate majors now participate in original research projects. Without exception, undergraduates who have participated in these research projects have gone on to graduate school after leaving CU. The VIGRE grant is discussed in more detail in §2H.

A different set of changes involves our identifying new areas of application of mathematics. These new applications and connections include the following:

- As a result of new partnership with Sun Microsystems (whose headquarters for Educational Services are in Broomfield), our department now teaches two courses in JAVA programming, some of our graduate students are JAVA-Certified Instructors, and some of our students (both undergraduate and graduate) have become interns or employees at Sun.

- By the fall semester, 2002, we hope to offer a joint Master's degree program between our department and the Department of Molecular, Cellular, and Developmental Biology (MCDB). Students graduating with these two Master's degrees (one in APPM, one in MCDB) will be well positioned to enter the emerging field of bioinformatics.

- *A Summer Institute in Applied Mathematics* now allows high-school teachers to refine and update their mathematical skills.

As our society changes, the Department of Applied Mathematics must also change in order to meet the changing educational needs. The new programs listed above are examples of such changes. On the other hand, an appealing feature of mathematics is that even in a changing world, mathematical facts do not change: the value of π is the same as it was in biblical times. The challenge for education in our department is to present timeless mathematics in such a way that its relevance to today's problems remains evident, even as the problems change. The challenge for research in our department is to identify new problems in which mathematics is relevant.

Harvey Segur	Anne Dougherty
Chair	Associate Chair

1. ROLE AND MISSION

The objectives of the Department of Applied Mathematics at the University of Colorado at Boulder are summarized below:

a) Provide undergraduate and graduate students with a high quality education and training in applied mathematics and prepare them for careers in industry, laboratories and the academic professions;

b) Offer and monitor degree programs leading to a BS, MS and PhD degrees in Applied Mathematics;

c) Nourish and maintain a professional environment in which excellence in teaching, learning, scholarship and creativity are of central importance;

d) Assure teaching and research expertise in a number of key areas of applied mathematics including the methodology of applied mathematics, computational mathematics and algorithms, industrial applications, applied probability and statistics.

2. DEPARTMENTAL ACTIVITIES

A. Undergraduate Education

Undergraduate education in the Department of Applied Mathematics provides our students with broad-based preparation for the challenges and opportunities of today. Through courses, projects, research and other activities, the Department provides a unique educational experience to our majors and minors. The Department also has a large teaching commitment since most undergraduate engineering majors are required to take four courses in applied mathematics. The Department taught a total of 3,091 undergraduate and graduate students. See §6 for a detailed list of the courses taught.

As any student who has taken a course from James Curry knows, our program seeks to develop skills in mathematics, computation and communication (mc^2). We had 63 undergraduate majors with 10 receiving their baccalaureate degrees. We are proud that 23 students in the fall and 18 in the spring semester made the Dean's List for academic achievement, with grade point averages of 3.5 or better. Our minor program also continues to grow, attracting students interested in more in-depth training in applied mathematics. Thirty students, with majors in either

4

Engineering or Arts & Sciences, are pursuing minors in Applied Mathematics. This is an increase of 10 students from last year.

The undergraduate student chapter of SIAM (the Society for Industrial and Applied Mathematics) is responsible for promoting interactions between applied math faculty and majors. It also sponsors activities and presentations that introduce undergraduates to the use of mathematics in engineering and the sciences. Events this past year included student presentations, several of which were the result of VIGRE-sponsored research projects, invited speakers and the ever-popular mentor lunches. (For a complete list of presentations, please see §4F.) Saverio Spagnolie served as Chapter President and he was assisted by Mary Kindel and Debbie Hinck. The officers for the 2001-02 academic year will be Mary Kindel (President), Jocelyn Renner and Stefan Wild. Anne Dougherty was the faculty advisor for 2000-01 and will continue in that capacity next year.

The art of creating and testing mathematical models of important real-world problems is an increasingly important part of undergraduate training. Undergraduate students are given an opportunity to showcase their mathematical, computational and communication skills in the annual Mathematical Contest in Modeling. Students from all science, math and engineering majors are encouraged to enter. In 2001, the Applied Math Department entered two 3-person teams in this international contest sponsored by COMAP (The Consortium for Mathematics and its Applications). The contest ran from 12:01 am February 9, 2001 until midnight February 12, 2001 and drew entries from 496 teams from around the world. One team consisted of Saverio Spagnolie, Tye Rattenbury, and Grant Macklem, all applied math majors, who created and analyzed models of spoked versus solid-disk bicycle wheels to determine what advantage each might give in a race. The report they submitted was awarded an Honorable Mention. Applied Math's other team of Jim Barron (physics and math double major), Olivia Koski (physics major) and Jill Kamienski (computer science major) studied ways to evacuate Charleston, South Carolina as quickly as possible in the event of a hurricane, like 1999's Hurricane Floyd. Their report was judged Meritorious, within the top 16% of all submissions. Bengt Fornberg and Anne Dougherty served as faculty advisors for both teams.

The VIGRE Grant that the department received from the National Science Foundation has fundamentally changed the character of our undergraduate major. Twelve of our more senior undergraduates have participated in "tetrahedra" consisting of undergrads, grads, postdocs and faculty working together on many parts of a common research theme. See §2H for more information about VIGRE.

At the May graduation ceremony Tye Rattenbury was the recipient of the Colorado Engineering Council's 2001 Outstanding Senior Silver Medal Award. This is the first time an Applied Math major has been so honored. Tye also received the Henrie-James award for

outstanding scholarship and service by an Applied Math graduating senior continuing to graduate school. Other departmental awards went to Mark Snyder as the outstanding graduate in research, and Jillian Redfern for outstanding service. Mark Snyder is also the Department's first concurrent BS/MS student. Two of our graduating seniors, both VIGRE participants, will be continuing their education in graduate programs: Tye Rattenbury will study computer science at Berkeley, and Mark Snyder will join the Operations Research Department at Columbia. The members of the Undergraduate Committee were John Williamson (Chair), Anne Dougherty, Bengt Fornberg and Keith Julien.

B. Graduate Education

The previous section (§2A), on Undergraduate Education, listed the skills that our graduating seniors should possess. Graduate education in Applied Mathematics is more individualistic: our graduate program has requirements, but each student has much more say in his/her own curriculum. This individuation is especially evident at the PhD level: two PhD theses from this department might have almost no common ground.

The main areas of research in the department are: computational mathematics, physically applied mathematics, dynamical systems, analysis, and statistics/probability. Many of the PhD theses produced within our department are related to one of these areas. However, the department also has a vigorous Affiliated Faculty program, and students in the department can (and do) complete their PhD thesis under the direction of any of the 36 Affiliated Faculty. Long-term objectives of the department are to seek out and to encourage new areas of application of mathematics; our Affiliated Faculty play a crucial role in that process. (See §3B for a list of the affiliated faculty and their departments.)

In 2000-2001, the Department had 61 graduate students. This number is larger than in previous years, due primarily to the largest entering class in our department's history. Nearly half of our graduate students (29) were Teaching Assistants (TAs) in the Fall semester; as usual, the teaching load was smaller in the Spring (2001), when 23 served as TAs. Most of our students who were not TAs were supported by research grants. The biggest single source of funding for graduate students was NSF's VIGRE, which supported 8 of our graduate students in 2000-2001. (See §2H for more information about VIGRE.) Furthermore, 4 students were supported as research assistants within the department, 9 more were supported by affiliated faculty in other departments on campus, and an additional 10 held positions off campus (either in a government lab or in a private company).

In addition, two of our students held prestigious Chancellor's Fellowships. Each year CU awards approximately 5 Chancellor's Fellowships to outstanding applicants for graduate school at

CU that year. Students in Applied Mathematics win these awards surprisingly often. Among our current graduate students, Chancellor's Fellowships were awarded to Allison Baker for 1997-99, Neil Burrell for 1999-2001, and Scott MacLachlan for 2000-2002. Thus, CU's Graduate School decided that each of these students ranked among the 5 best graduate applicants for the entire Boulder campus in the year that they applied. This confirms the excellence of our best students.

Graduations were big this year. A record number of 6 students completed their PhDs in 2000-2001, with 2 more expected in August, 2001. In addition, 4 students received MS degrees, one of whom is continuing towards a PhD at CU. (See §2D for a list of this year's graduates.)

The concurrent Bachelor's-Master's program was created and approved during 1999-2000. The program permits a well-focused student to acquire both Bachelor's and Master's degrees in 5 years in our department. The first student to complete this program was Mark Snyder, in May, 2001. (Mark was an exceptional student in several respects. See §2A for some of his other accomplishments.)

Here are some aspects of the demographics of the graduate program in the Applied Math Department.

- Our graduate program continues to attract a large fraction of U.S. citizens: in 2000-2001, 64% of the incoming students with financial support were U.S. citizens; 60% of the students scheduled to begin in 2001-2002 will be U.S. citizens.

- Most graduate programs in mathematics across the US faced declining enrollment in 2000-2001, but our entering class (22) was the biggest in our history. Next year's entering class will be smaller, with 17 new students for 2001-2002, but still larger than our long-term average.

- The percentage of female graduate students (21%) fell to the low end of our usual range (20-40%). Considering the students planning to begin graduate study in 2001-2002, this fraction will increase substantially.

- The percentage of minority graduate students (10%) fell in the middle of our usual range (6-15%). The low percentage of minority students entering graduate study in any of the sciences is a nationwide concern. NSF established AGEP (Alliance for Graduate Education and the Professoriate) to address this problem. This year, Professor James Curry became Co-PI of a campus-wide AGEP grant. The goal of this grant is to increase minority representation in graduate study in the sciences across the Boulder campus.

The Graduate Committee for 2001-2002 consisted of Gregory Beylkin, Jem Corcoran, Cong-Ming Li, and Steve McCormick (Chair). The main business of the committee is to advise the current graduate students, recruit and admit students to the graduate program, and administer the preliminary exams.

C. Enrollment Statistics

Enrollment in the courses offered by the Department continues at extremely high levels. It is particularly noteworthy, given the faculty's small size, that the Department teaches so many students. The statistics over the past ten years are as follows:

Year	Total enrollment in courses	Applied Mathematics graduate students	Applied Mathematics undergraduate majors
1991-92	2781	27	50
1992-93	2797	28	47
1993-94	2809	33	47
1994-95	2670	39	51
1995-96	2734	40	54
1996-97	2973	46	52
1997-98	3108/**3323***	51	44
1998-99	3172/**3566***	49	54
1999-00	3166/**3529***	50	60
2000-01	3091/**3517***	61	63

*The totals in bold include all Calculus I & II Work Study Groups, as well as Calculus III Labs & Differential Equations Labs. Enrollment in our upper division courses has continued to increase. With projected increases in undergraduate enrollment we continue to foresee enrollment increases in applied mathematics courses.

D. Graduates

We would like to congratulate our students who graduated this past year with a degree in Applied Mathematics. They are:

PhD degree (See §7D for thesis titles)

August 2000	David Trubatch
December 2000	Ken Jarman
May 2001	Brian Bloechle, Tim Chartier, Andrea Codd, Hugh MacMillan

Master's degree

August 2000   Dani Bundy

May 2001   Benjamin Bergen, Marcio Carvalho*, Mark Snyder**

*Continuing with PhD

**Awarded a BS/MS Degree

Bachelor's degree

December 2000	Marissa Perez Black, Lynne Bryant, Thuha Njuyen
May 2001	Paul Albano, E. Peter Fox, Marla Jean Fulks, Matthew Mahoney, Tye Rattenbury, Jillian Redfern, Mark Snyder**

**Awarded a BS/MS Degree

E. Awards and Honors

- Tom Manteuffel became President of SIAM in January, 2001. SIAM is an international organization of scientists and mathematicians, with more than 9000 members. Tom can be found in Boulder much less often since he became President. He is President of SIAM until 2003.

- James H. Curry continues as Woodhull/Logicon Teaching Professor in the College of Engineering during 1999-2001.

F. Research

The research activities of the core faculty in the Department are varied. They include nonlinear dynamics, chaos theory, nonlinear waves, solitons and integrable nonlinear evolution equations, nonlinear optics, inverse problems, analysis of nonlinear equations arising in physical phenomena, computational mathematics including wavelet analysis, multigrid, iterative methods and computational fluid dynamics, applied and computational linear algebra and applied probability and statistics. Our affiliated faculty are rostered in a wide range of departments and nearby institutions, including Aerospace Engineering; Astrophysical and Planetary Sciences; Chemistry and Biochemistry; Civil Engineering; Colorado School of Mines; Computer Science; Electrical and Computer Engineering; Geological Sciences; Mathematics; Mechanical Engineering; CIRES (Cooperative Institute for Research in Environmental Sciences); INSTAAR (Institute for Arctic and Alpine Research); and the Graduate School of Business.

This report provides data which show that the faculty in the Department is extremely active in their research and scholarly work (lists of publications, invited lectures and Department Preprints are included at the end of this report). However, another very important aspect of the faculty's role in the national and international scholarly effort in applied mathematics is service as editors and advisory board members of archival journals and textbook series. In fact, during 2000-2001, the faculty in the Department currently serves in 15 such capacities on 12 journals/periodicals, which include:

Applied and Computational Harmonic Analysis (Beylkin)

Cambridge University Press Texts in Applied Mathematics (Ablowitz)

Communications on Applied Nonlinear Analysis (Bebernes, Easton)

Communication on Pure and Applied Analysis (Li)

Electronic Transactions in Numerical Analysis (Manteuffel)

Journal of Engineering Mathematics (Ablowitz)

Journal of Numerical Linear Algebra and Applications (Manteuffel)

Mathematical Association of America Monthly (Curry)

Physica D (Meiss)

Proceedings of the American Mathematical Society (Ablowitz)

Rocky Mountain Journal of Mathematics (Bebernes)

SIAM Journal of Numerical Analysis (Manteuffel, McCormick)

Studies in Applied Mathematics (Ablowitz)

G. Copper Mountain Conference - 2001

We organize the Copper Mountain Conference in April of each year, alternating between Iterative Methods in even years and Multigrid Methods in odd years. This year the conference was on Multigrid Methods and was held on April 1-6. There were 120 participants and 70 lectures. A special feature of this conference is the support of students, which usually amounts to free lodging and registration, and travel assistance in some cases, for over 30 graduate students. The Student Paper Competition and substantial participation by the students in the lecture program and audience has been one of the hallmarks of this series. Further, student participation, for all of the reasons just given, has made the Copper Mountain conferences a central contributor to the fields of multigrid and iterative methods.

10

H. Department-wide Grants

VIGRE (Vertical Integration in Research and Education) is an NSF-funded program that supports education and research. Professor Jim Meiss secured this grant in 1999, and he remains its Principal Investigator. In CU's Department of Applied Mathematics, VIGRE is organized around tetrahedral research groups. A tetrahedron is a pyramid with four vertices and four triangular faces. In the VIGRE program, the vertices represent components of the research group, faculty, postdoctoral fellows, graduate students and undergraduates (F,P,G,U in the figure). Currently there are four tetrahedra: Nonlinear Waves, Dynamical Systems, Fast Algorithms and Multilevel Computation.
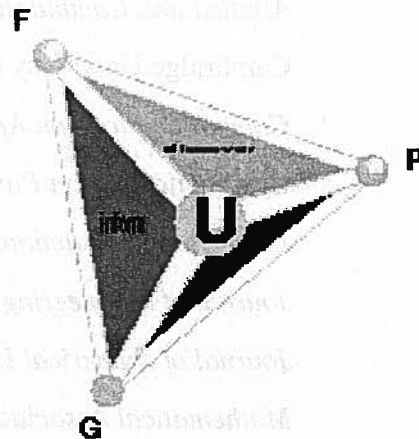
In the past year, VIGRE supported four postdoctoral fellows (Deborah Alterman—Nonlinear Waves, Panos Panayotaris and Gareth Roberts—Dynamical Systems, Natasha Flyer—Fast Algorithms). Next year two new fellows will join (Brian Bloechle and Jeffrey Heys—Multilevel Computation).

VIGRE also provided traineeships to nine graduate students pursuing a Ph.D. degree. VIGRE trainees John Carter, Hugh MacMillan and Travis Austin will all receive their Ph.D. degrees in 2001. In addition, more than a dozen undergraduates worked on VIGRE projects this year. Colorado's VIGRE program has been active for only two years, but it has already demonstrably changed the lives of many of its participants.

For example, undergraduates have learned that doing research is considerably different than producing answers to homework exercises. This surprise has often been a pleasant one. So far, every undergraduate who was supported by VIGRE has gone on to graduate school after graduating. Mark Snyder, a senior who will attend graduate school at Columbia University next year, says, "Working under the VIGRE grant taught me many valuable skills and changed my life plans. Before I started working under the VIGRE grant I wasn't even considering going to graduate school." Jeremy Horgan-Kobelski, a senior applied mathematics major, says, "I think it's very valuable for students to get a glimpse of what real academic research is like. I know that I've learned a lot more than just mathematics as part of the program." Tye Rattenbury, a senior who will begin graduate work at Berkeley next year, learned that learning the process for doing research is often as important as the results. He says, "The fulfillment of research is in walking the path of discovery, and sharing that path with others through papers and conferences."

Graduate students, who traditionally have been on only the receiving side of the mentoring

process, have discovered that being on the providing side is surprisingly difficult, and yet rewarding. John Carter is a VIGRE graduate trainee who will be receiving a Ph.D. this year and moving to a faculty position at Seattle University. He has been mentoring Saverio Spagnolie in a project in nonlinear waves, while simultaneously being mentored by Professor Harvey Segur on his thesis project. He says: "these experiences taught me much about communicating mathematics, and lead to my studying areas of mathematics that I would not have otherwise studied. Both of these skills will be very important in my future career as a university professor."

VIGRE has also shaken up postdoctoral education and research. Under the old structure, there were postdoctoral fellows, who worked on specific research projects with faculty advisors, and instructors, who learned about teaching by doing. VIGRE postdoctoral fellows have a foot in each of these roles, as well as in the role of being a mentor. Gareth Roberts, a VIGRE postdoc for two years, will begin a faculty position at College of the Holy Cross in Worcester MA, next fall. One of his VIGRE activities has been to supervise undergraduate Jeremy Horgan-Kobelski in a project on complex dynamics. Gareth notes that this work "provided me with valuable experience on being a research advisor. During my recent job search, several employers expressed an interest in the mentoring work I was doing with Jeremy." Thus, although Colorado's VIGRE program is just beginning, its effect is already large.

CCHE Program of Excellence in Applied Mathematics - Each year the Colorado Commission on Higher Education (CCHE) funds programs as part of its effort to support outstanding programs in the state of Colorado. The Colorado Program of Excellence in Applied Mathematics at the University of Colorado (Boulder and Denver campuses) was funded for the period 1999-2004. Our effort brings together postdoctoral researchers/instructors, graduate students, undergraduates and faculty in a closely aligned vertical integration effort to enhance scholarship, creativity, teaching and learning at all academic levels. The research funded by this grant on the Boulder campus has focused on using optical fibers for high bit-rate communications. Mathematical and computational modeling are used to understand, design and build new systems of optical fibers, often without the need for expensive laboratory equipment. The startup cost of a fully equipped laboratory in this subject would run into millions of dollars, plus a large yearly cost for maintenance. On the other hand, the effort supported by the CCHE Program of Excellence grant allows researchers to make effective predictions in this field by employing novel mathematical models and relatively inexpensive high performance workstations and personal computers. Researchers envision that future transmission fibers will carry hundreds of channels of information simultaneously. Hence the need for accurate mathematical models will become even more critical in the future.

Another important aspect of the CCHE program is our interest in supporting new outreach efforts dedicated towards K-12 teachers. Here the concept is to explore the use of applied mathematics and computing, in a wide variety of settings and provide K-12 teachers with a new range of development activities. Improved training of K-12 faculty pays off handsomely, not only with better trained professionals, but also with an inevitable by-product: enhanced learning and excitement about mathematics in our K-12 students.

I. Outreach

The outreach efforts of the Department are an extension of its mission to provide education and training in applied mathematics. These efforts have focused in two areas: (1) professional development for middle and high school math teachers; and (2) mathematical encouragement and enrichment for high school students.

In Summer 2000, the Department of Applied Mathematics, with major funding from the CCHE Excellence grant (see §2H) and additional funding from the CU-Boulder Outreach Committee, sponsored two week-long workshops for high school teachers. One workshop covered selected topics in calculus, the other focused on probability and statistics. There were a total of 23 participants, 11 in calculus and 12 in prob/stat. For Summer 2001, the workshops have been expanded to two weeks each (July 9-19) and an additional program in discrete mathematics has been added. Each workshop offers an in-depth study of a topic in mathematics together with software applications and projects that teachers can incorporate into their own classrooms.

Applied Mathematics also participates in a number of programs targeted towards high school students. The purpose of these programs is to encourage students to continue their study of mathematics and to give them some understanding of a specific application, since students with a sound mathematical background have many more opportunities available to them in scientific and technological fields. Applied Math presentations were made at each of the following engineering and science-based programs:

- Summer Multicultural Access to Research Training (SMART), sponsored by the CU Graduate School. James Curry mentored 2 students during the 10-week summer program in both 2000 and 2001.

- Success Institute, June 21-24, 2000. Presenter was Kari Tenfjord.

- Engineering Open House, October 21, 2000. Presenters were Kristian Sandberg and Mark Petersen.

- Women in Engineering Career Day programs for high school girls, October 16, 2000 and March 3, 2001. Presenters were Kristian Sandberg and Mark Petersen.

- High School Honors Institute: July 29 through August 1, 2001, presenters were graduate students Scott MacLachlan and Neil Burrell and faculty member Bengt Fornberg.

J. Changes in Personnel

The good news is that Jem Corcoran joined our faculty as Assistant Professor one year ago. Jem received her PhD in statistics from Colorado State in 1998. She moved here a year ago from the Statistics Department at the University of Georgia. She is the first of three new faculty members that this department intends to hire in the area of statistics/applied probability within the next few years. We expect this area to become one of the department's areas of strength in the near future.

The sad news is that Bob Easton retires in 2001. (Bob doesn't see this as sad news!) Bob has been doing interesting research in dynamical systems ever since he joined the faculty of the University of Colorado in 1973. In that time, Bob has spent more than 3500 hours in front of a classroom, and he has taught more than 3000 students. Bob is looking forward to continued research (both in and out of mathematics) as Professor Emeritus, with no committee work and no teaching duties. Thank you, Bob.

Almost the entire office staff turned over in 2000-2001. We are particularly grateful to Stu Naegele, who moved to another department at CU after 7 fruitful years as our office manager. Catherine Larkins has ably taken over Stu's duties, and has adapted wonderfully to working in the midst of mathematicians. Teri Tornow has done well in her role as student coordinator. Bridget Bogle has assisted Catherine with the increasingly complicated budgetary issues of the department. (See §3D for a complete list if the departmental staff.)

Mark Ablowitz and James Curry have stepped down as Departmental Chair and Associate Chair, respectively. Harvey Segur is the new Chair; Anne Dougherty is the new Associate Chair.

3. FACULTY, RESEARCH ASSOCIATES AND STAFF

A. Core Faculty and Long Term Visitors

Mark J. Ablowitz, Professor; PhD, Massachusetts Institute of Technology. Partial Differential Equations, Solitons, Nonlinear Waves.

Deborah Alterman, Postdoctoral Research Associate; PhD, Northwestern University. Nonlinear Waves.

Jerrold Bebernes, Professor; PhD, University of Nebraska. Differential Equations, Reaction Diffusion Systems, Combustion Theory, Analysis.

Gregory Beylkin, Professor; PhD, New York University. Computational Methods, Wavelets, Geophysical Inverse Scattering.

Amy Biesterfeld, Instructor; PhD, University of California at Los Angeles. Applied Probability, Stochastic Processes.

Jem Corcoran, Assistant Professor; PhD, Colorado State University. Applied Stochastic Processes, Perfect Simulation, Statistical Physics.

Robert Cramer, Postdoctoral Research Associate; PhD, University of Colorado at Boulder. Numerical Analysis, Wavelets, Potential Theory

James H. Curry, Professor; PhD, University of California at Berkeley. Dynamical Systems, Numerical Methods, Nonlinear Equations.

Hans De Sterck, Postdoctoral Research Associate; PhD, K.U. Leuven, Belgium. Numerical Analysis, Plasma Astrophysics.

Anne Dougherty, Assistant Chair & Senior Instructor; PhD; University of Wisconsin, Madison. Applied Probability, Stochastic Processes.

Robert Easton, Professor; PhD, University of Wisconsin. Dynamical Systems, Hamiltonian Mechanics.

Natasha Flyer, Postdoctoral Research Associate; PhD, University of Michigan, Ann Arbor. Numerical Analysis, Nonlinear Waves

Bengt Fornberg, Professor; PhD, Uppsala University, Sweden. Numerical Analysis, Computations of Wave Phenomena.

Toshi Hirooka, Postdoctoral Research Associate; PhD Osaka University, Japan. Optical Soliton Communications.

Keith Julien, Assistant Professor; PhD, Cambridge University, U.K. Mathematical and Computational Fluid Dynamics, Dynamical Systems Theory.

Elisabeth Larsson, Postdoctoral Research Associate; PhD, Uppsala University, Sweden. Numerical Analysis, Computations of Wave Phenomena.

Jongwoo Lee, Visiting Professor; PhD, University of Wisconsin, Madison. Higher Order Methods, Scientific Computation, Computational Electrodynamics.

Congming Li, Associate Professor; PhD, New York University. Elliptic Partial Differential Equations.

Tom Manteuffel, Professor; PhD, University of Illinois, Urbana. Computational Math, Numerical Linear Algebra, Iterative Mathematics, Numerical Solution of PDE's.

Steve McCormick, Professor; PhD, University of Southern California. Computational Math, Numerical Partial Differential Equations, Multigrid Methods, Parallel Computation, Computational Fluids, Tomography, Electromagnetics.

James D. Meiss, Professor; PhD, University of California at Berkeley. Dynamical Systems, Hamiltonian Mechanics, Plasma Physics.

Martin Mohlenkamp, Postdoctoral Research Associate; PhD, Yale University. Computational Harmonic Analysis, Non-linear PDEs and Cryptography.

Lucas Monzón, Postdoctoral Research Associate; PhD, Yale University. Harmonic Analysis, Wavelets.

Ziad Musslimani, Postdoctoral Research Associate; PhD, Technion – Israel Institute of Technology. Mathematical and Physical Applications of Solitons.

J. Adam Norris, Part-time Instructor; PhD, University of Colorado, Boulder. Phase Change Kinetics, Perturbation Methods, Numerical Methods.

Panayotis Panayotaros, Postdoctoral Research Associate; PhD, University of Texas at Austin. Nonlinear Waves, Fluid Mechanics, Hamiltonian Dynamical Systems.

Gareth Roberts, Postdoctoral Research Associate; PhD, Boston University. Dynamical Systems.

Ulrich Ruede, Postdoctoral Research Associate; PhD, Technische Universität München. Numerical simulations in science and engineering.

Harvey Segur, Chair, Professor; PhD, University of California at Berkeley. Nonlinear Waves, Fluid Dynamics, Asymptotic Methods.

John Williamson, Professor; PhD, University of Minnesota. Statistical Methods in Genetics, Applied Probability, Mathematical Statistics.

B. Affiliated Faculty--Graduate Department

Steve C. Arendt (Colorado Research Associates), Theoretical Fluid Dynamics

Mark Balas (Aerospace Engineering, Electrical Engineering), Control of large-scale and distributed parameter systems, system identification and adaptive control, Nonlinear PDE's, Numerical Methods for model reduction, controller synthesis and stability analysis.

Norm Bleistein (Mathematics, Colorado School of Mines), Direct & Inverse Scattering, Asymptotic Methods, Wave Phenomena

William Blumen (Program in Atmospheric and Oceanographic Sciences--PAOS), Geophysical Fluid Dynamics in Atmospheric Science

Elizabeth Bradley (Computer Science), Scientific Computation, Artificial Intelligence, Nonlinear Dynamics

Richard Byrd (Computer Science), Numerical Computation, Optimization Algorithms

John Cary (Physics), Nonlinear Dynamics, Plasma Physics, Accelerator and Space Physics

Senarath deAlwis (Physics), Theoretical Physics, String Theory, Quantum Gravity

Thomas DeGrand (Physics), Numerical Methods for Quantum Field Theory

Fred Glover (Graduate School of Business), Large-scale Systems, Applied Artificial Intelligence, Optimization Models

Martin Goldman (Physics), Plasma Physics, Nonlinear Waves, Turbulence

Vijay Gupta (Geological Sciences; Cooperative Institute for Research and Environmental Sciences), Hydrology, Stochastic Processes, Fluid Dynamics

Ute Christina Herzfeld (INSTAAR, Geomathematics), Geostatistical Analysis of Remote Sensing Data, Applications in Glaciology, Marine Geophysics and Global Change Research

Tissa Illangasekare (Environmental Science and Engineering Division, Colorado School of Mines), Mathematical Modeling of Flow and Transport in Porous and Fractured Media, Computational Methods, Numerical Modeling.

Elizabeth Jessup (Computer Science), Numerical Computation, Parallel Computation

David Kassoy (Mechanical Engineering), Fluid Dynamics, Combustion Theory, Thermal Science

16

James Kelly (College of Business), Heuristic Search, Optimization, Artificial Intelligence

Manual Laguna (College of Business), Exact and Heuristic Methods for Combinatorial Optimization Problems, Network Flow Programming, Applied Artificial Intelligence

Michael Lightner (Electrical Engineering), VLSI, Discrete Mathematics, Graph Theory

Andrew Moore (Atmospheric and Oceanic Sciences), Ocean-Atmosphere Modeling

Oliver McBryan (Computer Science), Parallel Computation, Graphics and Visualization, Computational Fluid Dynamics

Lev Ostrovsky (CIRES/NOAA Environmental Technology Laboratory), Nonlinear Waves, Fluid Dynamics, Oceanography, Acoustics

K.C. Park (Aerospace Engineering) Parallel computation, Structural vibrations

Harihar Rajaram (Civil, Environmental and Architectural Engineering), Fluid Flow, Transport Phenomena and Reactive Processes in Geologic/Geochemical Phenomena

John Rundle (Geological Sciences; Cooperative Institute for Research in Environmental Sciences), Statistical Mechanics Applied to Earth Sciences, Complex Systems, Simulations of Nonlinear Systems, Earthquakes, Transport Processes in the Geological Sciences

Robert Sani (Chemical Engineering), Computational Fluid Dynamics, Free and Moving Boundary Problems, Stability of Systems

Robert Schnabel (Computer Science), Numerical Methods for Optimization, Nonlinear Equations, Parallel Scientific Computation

J. Michael Shull (Astrophysical and Planetary Sciences), Theoretical Astrophysics

Rex Skodje (Chemistry and Biochemistry; Joint Institute for Laboratory Astrophysics), Nonlinear Dynamics, Quantum Chaos, Molecular Dynamics

Renjeng Su (Electrical Engineering), Nonlinear Dynamics Modeling, Control, Robotics

Juri Toomre (Astrophysical and Planetary Sciences; Joint Institute for Laboratory Astrophysics), Astrophysics, Mathematical Modeling, Numerical Simulation

Patrick Weidman (Mechanical Engineering), Hydrodynamic stability, solitary waves and their interaction, counter-rotating vortex rings, Stokes flow on dendrite models, similarity flows in natural convection, fluid sloshing in freely suspended containers

Jeffrey B. Weiss (Astrophysical and Planetary Sciences; Atmospheric and Oceanic Sciences), Geophysical Fluid Mechanics, Turbulence, and Climate predictability

Thomas Warner (Atmospheric and Oceanic Sciences) Numerical modeling of mesoscal atmospheric phenomena; Marine meteorology

Joseph Werne (Colorado Research Associates), Fluid dynamics

Ellen Zweibel (Astrophysical and Planetary Sciences), Plasma Physics, Astrophysics

C. Short Term Visitors, 2000-2001

Vic Barocas, University of Minnesota, March 5, 2001

Pavel Bochev, Sandia National Laboratory, May 29-30, 2001

William Butler, Oak Ridge National Laboratory, April 24-May 3, 2001

Vani Cheruvu, Indian Institute of Technology, India, June 8-9, 2001

Silvana Delillo, Universita de Perugia, Italy, May 1-31, 2001

Holger Dullin, Loughborough University, UK, May 29-June 9, 2001

Rob Falgout, Livermore National Laboratory, April 10 -June 8, 2001

Rodney Halburd, Loughborough University, UK, December 27, 200 – February 8, 2001 and April 7 – 28, 2001

Takashi Inoue, Osaka University, Japan, April 3-June 29, 2001

Jim Jones, Livermore National Laboratory, April 13, 2001

Sang Dong Kim, Kyungpook University, Korea, January 30-February 17, 2001

Edgar Knobloch, University of Leeds, UK, May 12-19, 2001

Nathan Kutz, University of Washington, March 14-16, 2001

Barry Lee, Livermore National Laboratory, April 8, 2001

Chang Ock Lee, Inha University, Korea, January 23-February 15, 2001

Rich Lehoucq, Sandia National Laboratory, May 29-30, 2001

Hector Lomeli, University of California at Santa Cruz, September 20-24, 2000

Peter Monk, University of Delaware, November 2, 2000

Barbara Prinari, Universite de Lecce, Italy, February 3 – July 29, 2001

Mary Pugh, Dept. of Mathematics, University of Pennsylvania, April 4-6, 2001

Vanessa Robins, Australian National University, April 3-9, 2001

Allen Robinson, Sandia National Laboratory, May 29-30, 2001

Connie Schober, Old Dominion University, June 11-15, 2001

Nick Tuffilaro, Hewlett Packard Labs, November 29-December 1, 2000

D. Staff

Stu Naegele	Office Manager, prior to November 15, 2000
Catherine Larkins	Office Manager, since November 15, 2000
Bridget Bogle	Accounting Technician II
Bruce Fast	Systems Administrator
Margy Lanham	Professional Research Assistant
Teri Tornow	Student Services Coordinator, since November 1, 2000.
Michelle Travis	Student Services Coordinator, prior to October 31, 2001.
Misty Deyloff	Faculty Services Coordinator
Nat Sombutsiri	Student Assistant

4. COLLOQUIA, SEMINARS, SYMPOSIA, 2000-2001

A. Applied Mathematics Colloquium Schedule, 2000-2001
Our Applied Mathematics Colloquium series continues to be held on Friday afternoons during the academic year at 3:00 p.m., with refreshments preceding at 2:30 p.m. outside the APPM conference room, ECOT 226.

Akira Hasegawa, Himeji Dokkyo University and Soliton Communications, September 1, 2000, "Quasi-Soliton."

Richard Tapia, Rice University, September 8, 2000, "If It Is Fast, Must It Always Be Newton's Method?"

Juri Toomre, JILA and Department of Astrophysical and Planetary Sciences, University of Colorado at Boulder, September 15, 2000, "Turbulent Convection and Differential Rotation in the Sun."

Hector Lomeli, Instituto Tecnológico Autónomo de México (currently visiting University of California at Santa Cruz), September 22, 2000, "Canonical Melnikov's Method."

Lora Billings, Naval Research Laboratory, September 29, 2000, "Noise Induced Chaos in Population Dynamics."

Congming Li, Department of Applied Mathematics, University of Colorado at Boulder, October 13, 2000, "Analysis of Some System of Partial Differential Equations about Chemical Reactions in Rivers."

Richard Haberman, Southern Methodist University, October 20, 2000, "Slow Passage through Nonhyperbolic Homoclinic Orbits associated with Bifurcations and the Change in Action."

David Sholl, Department of Chemical Engineering, Carnegie Mellon University, October 27, 2000, "Separating Chemicals With The Aid of Computational Materials Modeling."

Peter Monk, Department of Mathematical Sciences, University of Delaware, November 3, 2000, "Forward and Inverse Scattering."

Tom Manteuffel, Department of Applied Mathematics, University of Colorado at Boulder, November 10, 2000, "Future Challenges in Computational Mathematics."

Richard Davis, Department of Statistics, Colorado State University, November 17, 2000, "Multivariate Regular Variation with Application to Financial Time Series Models."

Ulrich Ruede, Department of Computer Science, University of Erlangen (presently at Department of Applied Mathematics, University of Colorado), December 1, 2000, "Examples of Simulation in Science and Engineering: Plasma Immersion Ion Implantation and Ostwald Ripening."

Simon Tavener, Department of Mathematics, Colorado State University, January 19, 2001, "Marangoni-Bénard Convection with a Deformable Free Surface."

John Rundle, Department of Physics and CIRES, University of Colorado at Boulder, January 26, 2001, "The Dynamics of Earthquakes and Other Threshold Systems."

Annick Pouquet, NCAR, February 2, 2001, "Turbulence, Statistics and Structures: an Introduction."

Vakhtang Putkaradze, Department of Mathematics and Statistics, University of New Mexico, February 9, 2001, "How Many Ways Can a Pipe Leak? Two-fluid Analytical Solutions of Navier-Stokes Equations."

Keith Julien, Department of Applied Mathematics, University of Colorado at Boulder, February 16, 2001, "Constrained Thermal Convection."

Ruediger Landes, Department of Mathematics, University of Oklahoma, February 23, 2001, "Traveling Waves and the Detachment of a Boiling Liquid from the Heating Surface."

Lorrie A. Shepard, School of Education, University of Colorado at Boulder, March 2, 2001, "Implications for Higher Education of Assessment Reform K-12."

Vijay Gupta, Department of Civil and Environmental Engineering and CIRES, University of Colorado at Boulder, March 9, 2001, "Multiscale Hydrologic Aanalyses on Self-Similar River Networks."

J. Nathan Kutz, Department of Applied Mathematics, University of Washington, March 16, 2001, "Bose-Einstein Condensates in Standing Waves: The Cubic Nonlinear Schrodinger Equation with a Periodic Potential."

Emily Stone, Department of Mathematics and Statistics, Utah State University, March 23, 2001, "Nonlinear Models of Dynamics in Machining Processes."

Mary Pugh, Department of Mathematics, University of Pennsylvania, April 6, 2001, "Image Segmentation and Energy Dissipation."

Kristian Jenssen, Indiana University, April 13, 2001, "Hyperbolic Conservation Laws: Existence of Solutions and Qualitative Properties."

Tissa H. Illangasekare, Environmental Sciences and Engineering, Colorado School of Mines, April 20, 2001, "Physical Modeling at Intermediate-Scale to Investigate Up-Scaling Issues Related to the Behavior of Nonaqueous Phase Waste Chemicals in Heterogenous Aquifers."

Mike Shull, Astrophysical and Planetary Sciences, University of Colorado at Boulder, April 27, 2001, "Galaxy Formation, the First Stars, and the Intergalactic Medium."

Alfred Clark, Jr., Department of Mechanical Engineering, University of Rochester, May 4, 2001, "Mathematica: A Window on Applied Mathematics."

B. Seminars in Applied Mathematics, 2000-2001

The Department maintained the Applied Mathematics Seminar, a weekly seminar series on Thursday afternoons at 4:00 p.m. Each Thursday, we used the Physics seminar room G-031 and had coffee and tea on the 11th floor of Duane Physics. We are grateful to the Physics department for allowing us to use their facilities. A list of visiting speakers and the titles of their talks follows:

Alexander B. Ezersky, Institute of Applied Physics, Nizhny Novgorod, Russia, September 7, 2000, "The Dynamics of Defects in Spatially Periodic Hydrodynamic Systems."

Ziad H. Musslimani, Department of Applied Mathematics, University of Colorado at Boulder, September 28, 2000, "Composite Solitons."

Toshihiko Hirooka, Department of Applied Mathematics, University of Colorado at Boulder, October 26, 2000, "Transmission and Interaction of Optical Pulses in Dispersion-Managed Fibers."

Rod Halburd, Department of Mathematical Sciences, Loughborough University, January 25, 2001, "The Painlevé Property for Difference Equations."

Steven Cundiff, JILA/NIST and University of Colorado at Boulder, February 1, 2001, "Carrier-Envelope Phase Stabilization of Femtosecond Modelocked Lasers."

Vakhtang Putkaradze, Department of Mathematics and Statistics, University of New Mexico, February 8, 2001, "Two-fluid Radial Flow: Exact Solutions and Bifurcations."

Eric Cornell, JILA/NIST and University of Colorado at Boulder, February 15, 2001, "Dark Solitons, Dark-Bright Solitons, One- and Two-component Vortices, and Vortex Rings. Oh Yeah, and It's All in Superfluid Gas at 20 NanoKelvin."

Mark J. Ablowitz, Department of Applied Mathematics, University of Colorado at Boulder, February 22, 2001, "Open Problems in Solitons, Nonlinear Optics, and Communications."

Jane Wang, Department of Theoretical and Applied Mechanics, Cornell University, March 1, 2001, "Unsteady Aerodynamics of Insect Flight." (Joint colloquium with the Departments of Aerospace Engineering, Mechanical Engineering, and Applied Math)

Ute Herzfeld, Geomathematik, Universitaet Trier, Germany, and Department of Applied Mathematics, University of Colorado at Boulder, March 8, 2001, "Higher-Order Vario Functions and Their Application in Geostatistical Surface Classification."

J. Nathan Kutz, Department of Applied Mathematics, University of Washington, March 15, 2001, "The Optical Parametric Oscillator: Dynamics, Bifurications, and Stablization."

Mary Pugh, Department of Mathematics, University of Pennsylvania, April 5, 2001, "Long-Wave Unstable Thin Film Equations --- Singularities, Steady States, and Heteroclinic Orbits."

Eric Cornell, JILA/NIST and University of Colorado at Boulder, April 12, 2001, "PART II: Dark Solitons, Dark-Bright Solitons, One-and Two-component Vortices, and Vortex Rings. Oh Yeah, and It's All in Superfluid Gas at 20 NanoKelvin."

Barbara Prinari, Department of Applied Mathematics, University of Colorado at Boulder, April 19, 2001, "Towards an Inverse Scattering for the KP equations."

C. University of Colorado, Denver - University of Colorado, Boulder Joint Seminars in Computational Mathematics, 2000-2001

The Joint CU Denver-CU Boulder Computational Math Seminar continued the expanded form of last year, with the regular lecture on Tuesdays at 12:00 preceded by three hours of open discussion, with the location alternating between Denver and Boulder. There were typically 20 or more faculty, students, and visitors from the two campuses attending the open discussions and regular lectures. A list of the CU-Boulder speakers and the titles of their talks follows:

Hans De Sterck, Dept of Applied Mathematics, CU-Boulder August 29, 2000, "Numerical simulation techniques for the magnetohydrodynamics equations."

Randy Tagg, CU-Denver, September 19, 2000, "Ray Chaos."

B.C. Low, October 3, 2000, "Self-similar time-dependent solutions in ideal hydrodynamics and magnetohydrodynamics."

Lars Wahlbin, Cornell, October 17, 2000, "Negative results about positive approximations."

Christopher Pflaum, Lawrence Livermore National Laboratory, November 7, 2000, "Semi-unstructured grids in 3D."

Don Estep, CU-Denver, November 21, 2000, "Analysis of shear layers in a fluid with temperature-dependent viscosity."

Mark Rast, HAO/NCAR, December 5, 2000, "Convective heat transport and flow dynamics in a partially ionized fluid."

Robin Shandas, CU Health Sciences Center, February 6, 2001, "Experimental Techniques in Cardiovascular Biomechanics."

Simon Tavener, Colorado State University, CU-Denver, February 20, 2001, "Symmetry-Breaking in Fluid Flows."

Bengt Fornberg, Dept. of Applied Mathematics CU-Boulder, March 6, 2001, "Radial Basis Functions - A future way to solve PDEs to spectral accuracy on irregular domains?"

Jim Douglas, Jr., Purdue University, CU-Denver, April 17, 2001, "Development of Higher Order Finite Volume Methods for Elliptic Equations."

Bob Palais, University of Utah, April 24, 2001, "Pi is Wrong* and other hidden impediments to understanding mathematics."

Jeff Heys, Dept. of Chemical Engineering CU-Boulder, May 1, 2001, "An Elastohdrodynamic Model of the Anterior Eye with Application to Pigmentary Glaucoma."

D. Dynamical Systems Seminars
The weekly Dynamical Systems seminar is a research working group led by James Meiss and Robert Easton. Following is a list of the speakers and the titles of their talks:

Bob Easton, September 7, 2000, "Drift by coupling to an anti-integrable limit."

James Howard, September 14, 2000, "Dusty Chaos."

Hector Lomeli, September 21, 2000, "Integrability and hyperbolicity in planar billiards."

Panayotis Panayotaros, September 28, 2000, "Hamiltonian description of water waves on the sphere."

Jim Meiss, October 12, 2000, "Arnold Diffusion and the Bar Theorem."

Greg Duane, October 19, 2000, "Bell's Theorem In Synchronized Hyperchaos: Does Deterministic Chaos Resemble Quantum Mechanics?"

Keith Julien, October 26, 2000, "Highly Supercritical Magnetoconvection."

Emily Stone, November 2, 2000, "Nonlinear Models of Dynamics in Machining Processes."

Mark Synder, November 9, 2000, "Dynamical Systems that Satisfy Benford's Law."

Gareth Roberts, November 16, 2000, "Newton's versus Halley's method - a study via complex dynamics."

Nick Tufillaro, November 30, 2000, "A dynamical systems approach to nonlinear identification: simple examples with an RC circuit."

Adriana Gomez, December 7, 2000, "The dynamics of trace maps."

Kristian Sandberg, December 14, 2000, "Analysis of Fractals using Wavelets."

Bob Easton, January 25, 2001, "Origins of the Conley Index."

Jim Meiss, February 1, 2001, "Dynamical Chemistry, Transport, and Isolating Blocks."

Glen Stewart, LASP, February 8, 2001, "Instability Theory for Narrow, Self-Gravitating Rings."

David Sterling, February 22, 2001, "Self-Synchronizing Chaos using time-averaged coupling."

Keith Julien, March 1, 2001, "Codimension 2 steady-state interactions with O(2) symmetry."

Jim Howard, March 8, 2001, "Navigating near an Asteroid."

Jim Meiss, March 15, 2001, "Lagrangian Singularities and Twistless Tori."

Panos Panayotaros, March 22, 2001, "Amplitude equations for surface elastic waves."

Vanessa Robins, April 5, 2001, "Quantifying the structure of point patterns: statistical geometry and alpha shapes."

Bill Basener, Boston University, April 12, 2001, "Noncollision Singularities: Orbits of Planets that Move Infinitely Far Apart in Finite Time."

Liz Bradley, April 19, 2001, "Controlling Chaos."

Ben Bergen, April 26, 2001, "Lyapunov Exponents without Rescaling and Reorthogonalizat."

E. Probability and Statistics Seminars

Terry Shaw, Cable Vision Laboratories, September 5, 2000, "Tools for Estimation of Performance over Cable Data Systems."

Rajagopalan Balaji, CU Boulder, Department of Civil, Environmental and Architectural Engineering, September 25, 2000, "Nonparametric Function Estimation: Applications to Hydro Climate Data."

Kevin Coakley, National Institute of Standards & Technology, Statistical Engineering Division, October 9, 2000, "Local maxima of correlated measurements and the warmest day of the week."

Jem Corcoran, CU Boulder, Dept. of Applied Mathematics, October 16, 2000, "Scaled and layered multishift coupling for perfect simulation."

Brad Warner, Dept. of Mathematical Sciences, U.S. Airforce Academy, October 23, 2000, "Continuous Improvement in Cardiac Surgery."

Brad Biggerstaff, National Center for Infectious Diseases/CDC, Division of Vector-Borne Infectious Disease, October 30, 2000, "Modeling the frequency of human plague in the U.S. Southwest using climatological covariates."

Jeff Luftig, College of Business and Administration, CU Boulder, November 8, 2000, "Applying Data Mining Techniques for Industrial Problem-Solving (Part I)."

Jeff Luftig, College of Business and Administration, CU Boulder, November 8, 2000, "Applying Data Mining Techniques for Industrial Problem-Solving (Part II)."

Doug Nychka, National Center for Atmospheric Research, Geophysical Statistics Project, November 20, 2000, "Wavelet representations for nonstationary spatial fields."

Robert Lund, University of Georgia, December 11, 2000, "Geometric convergence rates of renewal sequences and markov chains."

Vladimir Pozdnyakov, The Wharton School of the University of Pennsylvania, January 29, 2001, "A Bound on LIBOR Futures Prices for HJM Yield Curve Models."

Galin Jones, University of Florida, Department of Statistics, February 5, 2001, "Honest Exploration of Intractable Probability Distributions via Markov Chain Monte Carlo."

Saralees Nadarajah, UC, Santa Barbara, Dept. of Statistics and Applied Probability, February 8, 2001, "Some New Distributions for Statisticians."

Thomas Lee, Colorado State University, Department Of Statistics, February 20, 2001, "Solutions to Three Practical Imaging Problems."

Jem Corcoran, University of Colorado, Department Of Applied Mathematics, March 20, 2001, "Aspects of Perfect Simulation for Stochastic Geometry."

F. SIAM Undergraduate Seminars

The following Seminars were sponsored by the SIAM Undergraduate chapter:

Saverio Spagnolie and Mark Snyder, Department of Applied Mathematics, October 11, 2000.

Holly Lewis, Josh Wells and Jeremy Horgan-Kobelski, Department of Applied Mathematics, November 15, 2000.

Dan Goldman, Industrial Light and Magic, "The Perfect Storm," November 27, 2000.

Saverio Spagnolie, Tye Rattenbury, Grant Macklem, Jim Barron, Jill Kamienski, Olivia Koski, Mathematical Contest in Modeling Presentation, March 15, 2001.

Professor Richard McGehee, University of Minnesota, "Datamining and the Human Genome," May 1, 2001.

Ashlie Singer, Department of Applied Mathematics, May 2, 2001.

5. FACULTY SERVICE TO THE UNIVERSITY, DEPARTMENT AND SOCIETIES, CALENDAR YEAR 2000

Mark Ablowitz: Chair, Department of Applied Mathematics, CU Boulder, term ending on June 30, 2000. Chair of Applied Math colloquium committee, member of Applied Math hiring committee. Member of College of Arts and Sciences Council of Chairs-term ending on June 30, 2000. Member of College of Arts and Sciences Strategic Planning Committee.

Jerrold Bebernes: CU representative to Rocky Mountain Mathematical Consortium.

Gregory Beylkin: Consultant for Pacific Northwest National Laboratory, Consultant for Fast Mathematical Algorithms and Hardware, Corp. Member of the Graduate Committee for Applied Mathematics, CU Boulder

Amy Biesterfeld: Member of the Probability and Statistics qualifying exam committee. Co-organizer for Probability and Statistics Colloquium, judge for 2000 Undergraduate Data Analysis contest.

Jem Corcoran: Member of Probability and Statistics Qualifying Exam Committee. Member of Faculty Search Committee, and member of Graduate Committee.

James Curry: Member of the Chancellor's New College committee. Served on Chancellor's task force on graduate education. Served as Department Associate Chair, January 2000 through June 30, 2000. Member of the Ford Foundation Fellows conference planning committee. Also served on several NSF review panels.

Anne Dougherty: Associate Chair for Department of Applied Mathematics beginning July 1, 2000. Member of undergraduate committee and undergraduate faculty advisor, member of the Probability and Statistics prelim committee, and search committee member; Department of Applied Mathematics. Faculty advisor for the SIAM Undergraduate Chapter. Actuarial certificate committee member. Participant in NACME's (National Action Council for Minorities in Engineering) Engineering Vanguard Program Mathematics Assessment, January 2000. Organized Applied Mathematics participation in several Engineering College programs: Engineering Orientation Program, August 22-25, 2000; Engineering Open House, October 21, 2000; Women in Engineering Career Days Programs, March 4, 2000 & October 16, 2000. Outreach programs to high school teachers in Calculus and Probability and Statistics.

Robert Easton: Member of the Educational Policy and Planning Committee, College of Engineering. Department representative to the Arts and Sciences Council, Chair of the Planning Committee of the Arts and Sciences Council, Spring 2000 and member of the Planning Committee, Fall 2000. Member of the Arts and Sciences Council Executive Committee, Spring 2000. Transfer credit evaluator for Applied Mathematics.

Bengt Fornberg: Member of CRCW (Council on Research and Creative Work) Spring 2000. Chairman of the Colloquium Committee, Spring 2000. Member of the Undergraduate Committee and the Budget Committee.

Keith Julien: Department of Applied Mathematics Undergraduate Committee member. Member of Faculty committee for EEF (Engineering Excellence Fund).

Congming Li: Member of the Department Graduate Committee.

Tom Manteuffel: President-Elect: Society of Industrial and Applied Mathematics. Chair of Science Policy Committee for SIAM. Member of the Departmental Computing Committee, the Compulational Math Prelim Committee, and the Compensation Committee. Co-Chairman of the 6th Copper Mountain Conference on Iterative Methods, April 2-7, 2000

Steve McCormick: Member of Comp Math prelim Committee. Associate Chair of the Graduate Program. Member of the Computing Committee.

James Meiss: Member of the Graduate Committee, Spring 2000. Preliminary Examination Committee Member, January 2000. International Education Scholarship Committee. Fellow, Center for Integrated Plasma Studies. Fellow, Colorado Center for Chaos and Complexity.

Harvey Segur: Applied Mathematics Department Chairman.

John Williamson: Undergraduate Committee Chairman. Member of the College of Engineering Scholarship Committee. Member of the College of Engineering Academic Council.

6. TEACHING ACTIVITIES

6A. Courses Taught by Department Faculty, Academic Year 2000-2001

(i) Undergraduate Courses

APPM 1350	*Biesterfeld, Mohlenkamp, Norris, Panayotaros,*	Calculus I for Engineers.
APPM 1360	*Alterman, Biswas, Curry, Dougherty, Norris,*	Calculus 2 for Engineers.
APPM 2350	*Hirooka, Li, Roberts,*	Calculus 3 for Engineers.
APPM 2360	*Easton, Fornberg, Larsson, Musslimani,*	Linear Algebra & Differential Equations.
APPM 2380	*Bebernes,*	Introduction to Ordinary Differential Equations.
APPM 2450	*Carvalho, Mullowney, Olson,*	Calculus 3 Lab.
APPM 2460	*Mullowney, Olson, Wojciechowski,*	Differential Equations Lab.
APPM 2480	*Docherty,*	Intro to O.D.E. Lab
APPM 3010	*Julien,*	An Introduction to Nonlinear Systems: Chaos.
APPM 3050	*Flyer,*	Symbolic/Numerical Computations

APPM 3310	*Panayotaros, Roberts*, Matrix Methods and Applications.
APPM 3570	*Dougherty*, Applied Probability.
APPM 4120	*Corcoran*, Operations Research
APPM 4350	*Alterman*, Methods in Applied Mathematics: Boundary Value Problems.
APPM 4360	*Ablowitz*, Methods in Applied Mathematics: Complex Variables.
APPM 4380	*Fornberg*, Modeling in Applied Mathematics.
APPM 4520	*Dougherty* , Markov Processes.
APPM 4570	*Biswas,Corcoran,Daly*, Statistical Methods.
APPM 4580	*Luftig*, Statistical Methods Data.
APPM 4650	*Manteuffel, Rüde*, Holley Introduction to Numerical Analysis.
APPM 4660	*Mohlenkamp*, Intermediate Numerical Analysis 2.
APPM 4955	*Dougherty*, Seminar--Applied Mathematics.

(ii) Graduate Courses

APPM 5120	*Corcoran*, Operations Research
APPM 5350	*Alterman*, Methods in Applied Mathematics: Boundary Value Problems.
APPM 5360	*Ablowitz*, Methods in Applied Mathematics: Complex Variables.
APPM 5440	*Williamson*, Applied Analysis 1.
APPM 5450	*Williamson*, Applied Analysis 2.
APPM 5460	*Meiss*, Dynamical Systems.
APPM 5470	*Segur*, Methods in Applied Mathematics 3: Partial Differential Equations.
APPM 5480	*Segur*, Methods 4.
APPM 5520	*Holley*, Introduction to Mathematical Statistics
APPM 5560	*Dougherty*, Introduction to Probability Problems.
APPM 5570	*Biswas, Corcoran*, Statistical Methods.
APPM 5580	*Luftig*, Statistical Methods Data.
APPM 5600	*Beylkin*, Numerical Analysis 1.
APPM 5610	*Beylkin*, Numerical Analysis 2.
APPM 5720	*Curry*, Wavelets.
APPM 6610	*Manteuffel, Rüde*, Intro to Numerical PDE's
APPM 6630	*Beylkin*, Numerical Computation 2.
APPM 7100	*Meiss*, Dynamical Systems
APPM 7400	*Bogle, De Sterck, McCormick, Mohlenkamp, Monzon*, Seminar—special topics.
APPM 8000	*Ablowitz*, Colloquium.
APPM 8100	*Nelson*, Seminar--Nonlinear Equations.
APPM 8100	*Julien*, Seminar--Dynamical Systems.

APPM 8200   *Manteuffel, McCormick,* Seminar--Computational Mathematics.

B. Summer Courses, 2001

APPM 1350   *K. Tenfjord,* Calculus I.

APPM 1360   *U. Schneider,* Calculus II.

APPM 2350   *S. MachLachlan, R. Horne,* Calculus III.

APPM 2360   *Z. Musslimani, M. Tearle,* Intro. Linear Algebra and Differential Equations

APPM 2450   *R. Girard,* Calculus III Lab

APPM 2460   *N. Burrell,* Differential Equations Lab

APPM 2710   *E. Wright,* JAVA I

APPM 2775   *J.A. Norris,* JAVA II

APPM 4650   *J.A. Norris,* Intro.to Numerical Analysis I

APPM 5040   *M. Nelson,* Calculus Applications for High School Teachers

APPM 5050   *N. Flyer,* Discrete Math for High School Teachers

APPM 5070   *A. Biesterfeld,* Applied Statistics for High School Teachers

7. RESEARCH ACTIVITIES FOR CALENDAR YEAR 2000

A. Research Publications for Calendar Year 2000

Mark Ablowitz

"Modulated Periodic Waves in Deep Water", with J. Hammack, D. Henderson, and C.M. Schober, *Phys. Rev. Lett.,* **84**, 887-890, (2000)

"A Novel Class of Solutions of the Non-stationary Schrodinger and the Kadomtsev-Petviashvili I Equations", with S. Chakravarty, A.D. Trubatch, and J. Villarroel, *Phys. Lett. A,* **267**, 132-146, (2000)

"On Integrability and Chaos in Discrete Systems", with Y. Ohta and A.D. Trubatch, *Chaos, Solitons, and Fractals,* **11**, 159-169, (2000)

"On a Burgers-Stefan Problem", with S. De Lillo, *Nonlinearity,* **13**, 471-478, (2000)

"Optical Solitons-Perpsectives and Applications", with G. Biondini and L. Ostrovsky, *Chaos,* **10.**, 471-474, (2000)

"Resonant nonlinear intrachannel interactions in strongly dispersion managed transmission systems", with T. Hirooka, *Optics Letters,* **25**, 1750-1752, (2000)

"On the Evolution and Interaction of Dispersion-Managed Solitons", with G. Biondini and E.S. Olson, *Massive WDM and TDM Soliton Transmission Systems"* Ed. A. Hasegawa, Kluwer Academic Publishes, 75-114, (2000)

"Nevanlinna Theory and Difference Equations of Painleve Type", with R. Halburd, *Nonlinearity, Integrability and all that: Twenty years after NEEDS 1979,* Eds. M Boiti, L Martina, F. Pempinelli, B Prinari, and G Soliani, World Scientific, 3-11 (2000)

"Solutions of a Burgers-Stefan Problem", with S de Lillo, *Physics Letters, .***271**, 273-276, (2000)

"On the Extension of the Painleve Property to Difference Equations", with R. Halburd and B. Herbst, *Nonlinearity,* **13**, 889-905, (2000)

"Spectral Collapse of Wavelength-division Multiplexed Dispersion Managed Solitons", with G. Biondini and E. Olson, *Technical Digest,* OSA/IEEE/LEOS Conference Nonlinear Optics: Materials, Fundamentals and Applications, 199-201, (2000), OSA Catalog #: 1-55752-646-X

"Four-wave Mixing in Strong Dispersion-Managed Wavelength-Division Multiplexed Soliton Systems", with G. Biondini, S. Chakravarty, R.L. Horne, and E. Spiller, *Technical Digest,* OSA/IEEE/LEOS Conference Nonlinear Optics: Materials, Fundamentals and Applications, 338-340, (2000) OSA Catalog #: 1-55752-646-X

Jerrold Bebernes

"Nonlocal Models of Shear Banding", *Proceedings of Venice-2, Symposium on Applied and Industrial Mathematics,* Kluwer Publishing, 33-46, (2000)

Jem Corcoran

"Perfect Sampling and Queueing Models", with R.L. Tweedie, Proceedings of the 38th Annual Allerton Conference on Communication, Control, and Computing.

Anne Dougherty

"Rate-Hardness: A new performance metric for haptic interfaces", with D.A. Lawrence, L.Y. Pao, M.A. Salada and Y. Pavlou , *IEEE Transactions on Robotics and Automation,* **16**, no.4,357-371, (2000)

"Extreme value theory and mixed distributions---Applications", with R.B. Corotis and L.M. Schwartz, *Applications of Statistics and Probability, ICASP8,* R. Melchers and M. Stewart, eds., **1**, 27-33, (2000)

Bengt Fornberg

"Some steady vortex flows past a circular cylinder", with A. Elcrat, M. Horne, and K. Miller, *J Fluid Mech,* **409**, 13-27, (2000)

"Note on nonsymmetric finite differences for Maxwell's equations", with T.A. Driscoll, *J. Comput. Physics,* **161**, 723-727, (2000)

Keith Julien

"Nonlinear Magnetoconvection in the Presence of Strong Oblique Fields", with E. Knobloch, and S.M. Tobias, *J. Fluid Mechanics,* **410**, 285, (2000)

"Numerical Modeling of the absorption and scattering of acoustic radiation by sunspots", with C.S. Rosenthal, *Astrophysical Journal,* **532**, 1230, (2000)

Thomas Manteuffel

"A boundary functional for the least-squares finite element solution of the neutron transport equation", with K.J. Ressel and G. Starke, *SIAM J. Numer. Anal.* **37**, 2, 556-586, (2000)

"First-order system least squares (FOSLS) for the Helmholtz equation", with B. Lee, S.F. McCormick, and J Ruge, *SIAM J. Sci. Comp.,* **20**, 1927-1949, (2000)

"First-order system least squares for the Stokes and elasticity equations: further results", with Z. Cai, C.-O. Lee, and S.F. McCormick, *SIAM J. Sci. Comp.,* **21**, 1728-1739, (2000)

"Robustness and scalability of algebraic multigrid (AMG)", with A. Cleary. R. Falgout, V. Henson, J. Jones, S.F. McCormick, G. Miranda, and J. Ruge, *SIAM J. Sci. Comp.,* **21**, 1886-1908, (2000)

"First-order system least squares for planar linear elasticity: numerical results", with Z. Cai, C.-O Lee, and S.F. McCormick, *SIAM J. Sci. Comp.*, **21**, 1706-1727, (2000)

Steve McCormick

"First-order system least squares (FOSLS) for the Helmholtz equation", with B. Lee, T. Manteuffel, and J Ruge, *SIAM J. Sci. Comp.*, **20**, 1927-1949, (2000)

"First-order system least squares for the Stokes and elasticity equations: further results", with Z. Cai, C.-O. Lee, and T. Manteuffel, *SIAM J. Sci. Comp.*, **21**, 1728-1739, (2000)

"Robustness and scalability of algebraic multigrid (AMG)", with A. Cleary. R. Falgout, V. Henson, J.Jones, T. Manteuffel, G. Miranda, and J. Ruge, *SIAM J. Sci. Comp.*, **21**, 1886-1908, (2000)

"First-order system least squares for planar linear elasticity: numerical results", with Z. Cai, C.-O Lee, and T. Manteuffel, *SIAM J. Sci. Comp.*, **21**, 1706-1727, (2000)

"A Multigrid Tutorial", second addition, with B. Briggs and V. Henson, *SIAM* , (2000)

James Meiss

"Computing Connectedness: Disconnectedness and Discreteness", with V. Robins and L. Bradley, *Physica D,* **139**, 276-300, (2000)

"Self-Rotation Number using the Turning Angle", with H.R. Dullin, *Physica D,* **145**, 1-2, 25-46, (2000)

"Generalized Henon Maps: the Cubic Polynomial Diffeomorphisms of the Plane", with H.R. Dullin, *Physica D,* **143**, 1-2; 265-292, (2000)

"Homoclinic Orbits and Transport in a Perturbed Integrable Suris Map", with H.E. Lomeli, *Physics Letters a,* **269**, 5-6, 309-318, (2000)

Harvey Segur

"The motion of a falling liquid filament", with L.Smolka, M. Wadati. and D. Henderson, *Phys. Fluids,* **13**, 550-567, (2000)

"Pole Dynamics for Elliptic Solutions of the Korteweg-de Vries Equation", with B. Deconinck, *Math. Phys. Anal. & Geom.,* **3**, 49-74, (2000)

"Evolution of a Tracer Gradient in an Incompressible, Two-dimensional Flow", *IUTAM Symp.: Developments in Geophys. Turbulenced,* by R.M. Kerr and Y.Kimura, Kluwer Pub.,143-150, (2000)

B. Invited Lectures and Meetings Attended for Calendar Year 2000

Mark Ablowitz

Conference: Integrable Systems, Kruskal 2000, Adelaide, Australia, "Chaotic Dynamics of Modulational Instability in Water Waves", January 4-9, 2000.

Department of Electrical Engineering, University of South Wales, Sydney Australia, "Dispersion Managed Solitons", January 10, 2000.

Conference: Geometric Integration, Durham, England, "Chaotic Dynamics of Modulational Instability in Water Waves", July 18-28, 2000; July 23, 2000.

Nonlinear Optics Workshop, Tucson, Arizona, Sept. 20-22, 2000, "Discrete Vector Nonlinear Schrodinger Equations", Sept. 20, 2000.

Conference: Symmetries and Integrability of Discrete Equations, Tokyo, Japan, "Reversible Cellular Automata with Boundaries", November 26 – December 1, 2000.

Invited participant special NSF Workshop: The Future Revolution in Optical Communications and Networking, Arlington, Virginia, December 4 – 5, 2000.

Jerrold Bebernes

SISSA, Trieste, "Shear Band Formation", May 10, 2000

SISSA, Trieste, "Blow-up for Nonlocal Problems", May 17, 2000

Universita di Trieste, "Shear Banding", May 18, 2000

Universita Lisboa, Lisbon, "Shear Band Formation", June 9, 2000

Gregory Beylkin

DARPA Program Review, "On the design of factored FIR and IIR filters", April 2000

DARPA Program Review, "Accurate Multiresolution Modeling of Earth's Gravitational Field", April 2000

University of California, Davis, "Applications of Unequally Spaced Fast Fourier Transform", May 19, 2000

University of Colorado, "Generalized Gaussian quadratures and a theorem of Caratheodory", February 2000

NATO Advanced Study Institute, Blair Atholl, Scotland, UK, "Towards Multiresolution Estimation and Efficient Representation of Gravitational Fields", July 2000

University of Colorado Molecular Biology Department, "Fast and accurate algorithms for tomography", March 2000

University of Virginia, "Progress on Computing Spectral Projectors in Two Dimensions", February 2000

University of California, Davis, "On direct Solvers, Multigrid and Numerical Homogenization", May 19, 2000

Jem Corcoram

University of Colorado, Probability and Statistics Seminar, "Scaled and Layered Multishift Coupling for Perfect Simulation," October 16, 2000

Robert Easton

Invited Lecture, Midwest Dynamical Systems conference, Cincinnati, Ohio, "Drift by Coupling to an Anti-integrable Limit", September 23, 2000

University of Colorado, Dynamical Systems Seminar, March 23 and September 7, 2000

Bengt Fornberg

Total of 10 presentations given at University of Colorado, Uppsala University (Sweden), HongKong University of Science and Technology, Chinese University (Hong Kong), and Hong Kong Baptist University

Keith Julien

Invited Lecture, 20th International Congress of Theoretical and Applied Mathematics

Invited Lecture, Dynamical Systems Workshop, Department of Mathematics, Colorado State University

Thomas Manteuffel

Invited Lecture, RT 2000 (Conference in Honor of Roger Temam), Paris, France, March 8, 2000

Keynote Speaker, Applied Mathematics Forum, Mt. Songni, Korea, June 26, 2000

Colloquium Speaker, Sandia National Laboratories, September 14, 2000

Colloquium Speaker, Korean Applied Mathematics Institute (KAIST), Daegu, Korea, June 30, 2000

Steve McCormick

Copper Mountain Conference, "Firsr-order system LL*", April, 2000

NCAR's HAO, "First-order system Least Squares and FOSLL*", November, 2000

Sandia National Laboratories Colloquium, "First-order system Least Squares and FOSLL", September 2000

James Meiss

Review Lecture, Sherwood Plasma Theory Meeting, UCLA, "Transport in Chaotic Dynamical Systems", July 22-24, 2000

Mathematics Colloquium, University of Mexico (UNAM), "Dynamics of Polynomial Deffeomorphisms in the Plane", July 7, 2000

Applied Mathematics Seminar, University of Bristol, "Drifting Orbits Near the Anit-Integrable Limit", October 16, 2000

Mathematics Seminar, University of Surrey, "Drifting Orbits Near the Anit-Integrable Limit", November 9, 2000

Dynamical Systems Seminar, University College, London, "Rotation Number for the HénonMapping Unsing the Truning Angle" November 8, 2000

Dynamical Systems Seminar, Queen Mary and Westfield College, "Drifting Orbits Near the Anit-Integrable Limit", November 7, 2000

Dynamical Systems Seminar, Imperial College, "Drifting Orbits Near the Anit-Integrable Limit", October 25, 2000

Dynamics Seminar, University of Warwick, "Drifting Orbits Near the Anit-Integrable Limit", October 24, 2000

Applied Mathematics Seminar, University of Loughborough, "Heteroclinic Orbits for Three Dimensional,Volume Preserving Mappings", October 19, 2000

Dynamical Systems Seminar, University of Loughborough, "Drifting Orbits Near the Anit-Integrable Limit", October 18, 2000

Harvey Segur

AMS Conference, Notre Dame, Indiana, "Stability of a Density-stratified Shear Flow", Aril 8, 2000

Applied Mathematics Department, University of Washington, Seattle, Washington, "Stability of a Density-stratified Shear Flow", May 22, 2000

Department of Mathematics, Brown University, Providence, Rhode Island, "Waves in Shallow Water", June 9, 2000

Physics Department, Washington University, St. Louis, Missouri, "Motion of a Falling Liquid Filament", October 25, 2000

C. Research Grants Active in 2000

	Amount for 2000
Mark Ablowitz	
NSF, Mathematics Division, 1997-2000, 2000-2003	$37,800
AFOSR, Mathematics, 1999-2001	$50,000
NSF, Engineering Communications, 1998-2001	$73,300
CCHE, 1999-2002;Co-PI's, B. Fornberg, J. Curry	$138,700
Gregory Beylkin	
DARPA/AFOSR, 1998-2000	$261,100

DARPA/Univ. of Va., 1996-99	$48,600
DARPA/USC, 1998-2001	$93,800
DARPA/Raytheon, 1998-2001	$71,000
NSF/ITR, 2000-2002	$70,400

Jem Corcoran
Co-PI, Univ. of Georgia 2000-2001, Co-PI H.-B. Schüttler — $13,300

James Curry
Co-PI. NSF/AGEP, 2000-2005, PI P. DeStefano,
Co-PI C. Lynch, — $72,000

Anne Dougherty
Co-PI CU Outreach Committee, 2000, Co-PI M. Nelson, J. Curry — $2,000

Bengt Fornberg
NSF, Mathematics Division, 1997-2000, 2000-2003 — $29,200

Keith Julien
NASA, 1997-2000 — $70,200
NSF/CORA, 1998-2000 — $11,900
NASA/CORA, 1999-2002 — $12,000

Congming Li
NSF, Mathematics Division, 1999-2002 — $22,300

Tom Manteuffel
DOE, Applied Mathematics, 1996-2001 — $101,800
DOE/Lawrence Livermore, 1998-2001; Co-PI's, S. McCormick,
C. Farhat, K.C. Park — $352,000
Co-PI, NIH, 1998-2001; PI, V. Barocas — $65,200

Steve McCormick
NSF, Math Div., 1997-2000, 2000-2003; Co-PI's T. Manteuffel,
T. Russell — $161,800

James Meiss
NSF, Mathematics Division, 1999-2002 — $26,800
NSF/VIGRE, 1999-2004; Co-PI's, M. Ablowitz, J. Curry,
B. Fornberg — $503,300

Harvey Segur
NSF, Mathematics Division, 1998-2002 — $29,900

John Williamson
Co-PI, NIMH, 1998-2001, PI J. Hewitt — $11,000

D. Dissertations for Academic Year 2000 – 2001

David Trubatch, "Topics in Solitons and Inverse Scattering: I. Discretization of the vector nonlinear Schrodinger equation, and II. A new class of 'reflectionless' potentials of the nonstationary Schrodinger equation and solutions of the Kadomtsev and Petviashvili I equation," Advisor: M. Ablowitz – Ph.D. August 2000.

Ken Jarman, "Stochastic immiscible flow with moment equations," Advisors: T. Manteuffel, T. Russell – Ph.D. December 2000.

Brian Bloechle, "On the Taylor dispersion of reactive solutes in a parallel-plate fracture-matrix system," Advisor: T. Manteuffel – Ph.D. May 2001.

Tim Chartier, "Element-based Algebraic Multigrid (AMGe) and Spectral AMGe," Advisor: S. McCormick – Ph.D. May 2001.

Andrea Codd, "Elasticity-fluid coupled systems and elliptic grid generation (EGG) based on first-order system least squares (FOSLS)," Advisor: S. McCormick – Ph.D. May 2001.

Hugh MacMillan, "First-order System least squares and electrical impedance tomography," Advisor: T. Mantueffel – Ph.D. May 2001.

Mark Snyder, "Stochastic Aspects of Dynamics: Benford's Law," Advisors: J. Curry and A. Dougherty – M.S. May 2001.

E.   Miscellaneous for Calendar Year 2000

Mark Ablowitz

U.S. Patent 6,049,608: Variable Length Nonlinear Feedback Shift Registers with Dynamically Allocated Taps, Issued April 4, 2000

Coordinating Editor: *Proceedings of the American Mathematical Society*

Editorial boards: *Journal of Engineering Mathematics; Studies in Applied Mathematics*; Cambridge University Press Texts in Applied Mathematics

NSF; Air Force grants, Australian research grants, South African research grants, Hong Kong Research Grants; *Physics Letters A; Physical Review Letters; Journal of Engineering Math; Cambridge University Press; Studies in Applied Math; Optics Letters.*

Jerrold Bebernes

Editor: *Rocky Mountain Journal of Mathematics.*

Gregory Beylkin

Advisory Editorial Board, *Applied and Computational Harmonic Analysis.*

Amy Biesterfeld

Referee: *Journal of Computational Statistics and Data Analysis; Journal of Technometrics*

Received a Faculty Appreciation Award from Multicultural Engineering Program, Fall 2000.

Jem Corcoran

Organizing Committee for Symposium: Inference for Stochastic Processes, University of Georgia

Referee: *Journal of Environmental and Ecological Statistics, Journal of Computational and Graphical Statistics*

Book Reviewer: *Journal of the American Statistical Association*

James Curry

Served on several NSF review panels; member of Ford Foundation Fellows conference planning committee

Associate Editor *MAA Journal.*

Robert Easton

Editorial Board: *Communications on Applied Nonlinear Analysis;* Refereed papers for a number of different journals

Bengt Fornberg

Refereed about a dozen articles for various journals

Proposal Reviewer: NSF and FRD (South African science foundation)

Keith Julien

Reviewer: *Dynamics of Oceans and Atmospheres, Physics of Fluids*

Peer Review for Grants, NSF Oceanography

Congming Li

Published 3 reviews for Mathematical Reviews of AMS; Reviewed papers for many professional journals; Editorial Board Communication on Pure and Applied Analysis.

Tom Manteuffel

Reviewer: NSF and DOE Grant Proposals, *SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing.*

Editor-in-Chief: SIAM Journal on Numerical Analysis.

Associate Editor: Electronic Transactions in Numerical Analysis.

Editorial Board: Numerical Linear Algebra and Applications.

Steve McCormick

Reviewer: NSF and DOE Grant Proposals, *AIMS Reviews, Zentralblatt*

Associate Editor-in-Chief: SIAM Journal on Numerical Analysis

James Meiss

Editor, *Physica D*

Computer Programs: IFS Iterated Function Systems and StdMap Area Preserving Dynamics for the Macintosh, both released to the internet.

Internet newsgroup sci.nonlinear, source for Frequently Asked Questions in Nonlinear Science

Reviewer for NSF Annual VIGRE Panel Meeting, September 11-12, 2000, NSF Grants Review Panel

Reviewer for Ordinary Differential Equations Textbook proposals for McGraw-Hill publishing company

Harvey Segur

Reviewer: *Physical Review Letters; Physica D; Journal of Atmospheric Science; Math and Computers in Simulation*; NSF Division of Mathematical Sciences, Panel on PDE's.

8. PREPRINTS OF THE DEPARTMENT: 2000-2001

The following is a list of preprints developed by Department faculty and visitors during this academic year. If you would like a copy of any preprint, please request a copy in writing from Margy Lanham, Department of Applied Mathematics, Campus Box 526, University of Colorado, Boulder, CO 80309-0526.

442. *A Multiresolution Approach to Regularization of Singular Operators and Fast Summation*, G. Beylkin and R. Cramer, September, 2000.

443. *Stochastic Aspects of One Dimensional Discrete Dynamical Systems: Benfords's Law*, M. Snyder, J.H. Curry, A. Dougherty, October, 2000.

444. *One Dimensional Discrete Dynamical Systems that Satisfy Benfords's Law*, M. Snyder, J.H. Curry, A. Dougherty, October, 2000.

445. *Nonlinear Feedback Shift Registers via Nonlinear Evolution*, M.J. Ablowitz, October 18, 2000.

446.   *Nonlinear Magnetoconvection in the Presence of Strong Oblique Fields*, K. Julien, E. Knobloch, S.M. Tobias, April 29, 1999

447.   *Nonlinear Magnetoconvection in the Presence of Strong Oblique Fields*, K. Julien, E. Knobloch, S.M. Tobias, April 29, 1999

448.   *Nonlinear Magnetoconvection in the Presence of Strong Oblique Fields*, K. Julien, E. Knobloch, S.M. Tobias, April 29, 1999

449.   *Strongly Nonlinear Magnetoconvection in Three Dimensions*, K. Julien, E. Knobloch, S. M. Tobias, April 29, 1999

450.   *A New Class of Equations for Rotationally Constrained Flows*, K. Julien, E. Knobloch, J. Werne, May 30, 1997

451.   *Fully Nonlinear Three-Dimensional Convection in a Rapidly Rotating Layer*, K. Julien, E. Knobloch, June 9, 1998

452.   *On Generalized Gaussian Quadratures for Exponentials and Their Applications*, G. Beylkin, L. Monzon, December, 2000

453.   *Nonlinear Schrödinger equations with mean terms in non-resonant multi-dimensional quadratic materials*, Mark J. Ablowitz, Gino Biondini, Steve Blair, December 13, 2000.

454.   *Four wave mixing in wavelength-division multiplexed dispersion-managed transmission systems*, M.J. Ablowitz, G. Biondini, S. Chakravarty, and R. L. Horne, March 8, 2001.

455.   *Prediction of Student Performance in Freshman Calculus*, Jenny McColl and Anne Dougherty, August 2, 2000.

456.   *Multiresolution Analysis of Elastic Degradation in Heterogeneous Materials*, Kaspar Willam, Inkyu Rhee and Gregory Beylkin, May 2001.

457.   *Approximation of High Dimensional Control Systems Using Best-Basis Representations*, Shane Fazzio and Greg Beylkin, May 2001.

458.   *Towards Multiresolution Estimation and Efficient Representation of Gravitational Fields*, Gregory Beylkin and Robert Cramer, May 2001.

39