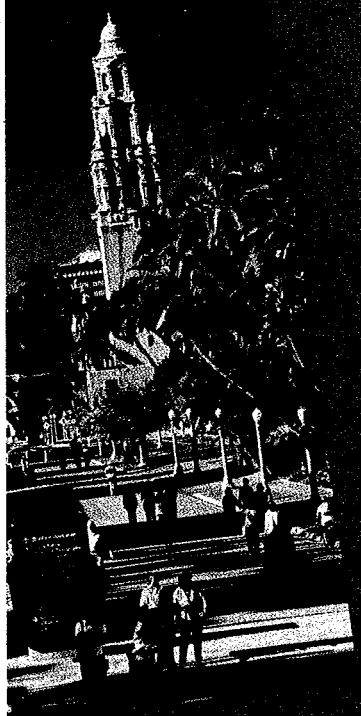
SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

Preliminary Program



1989 SIAM Annual Meeting

JULY 17–21, 1989

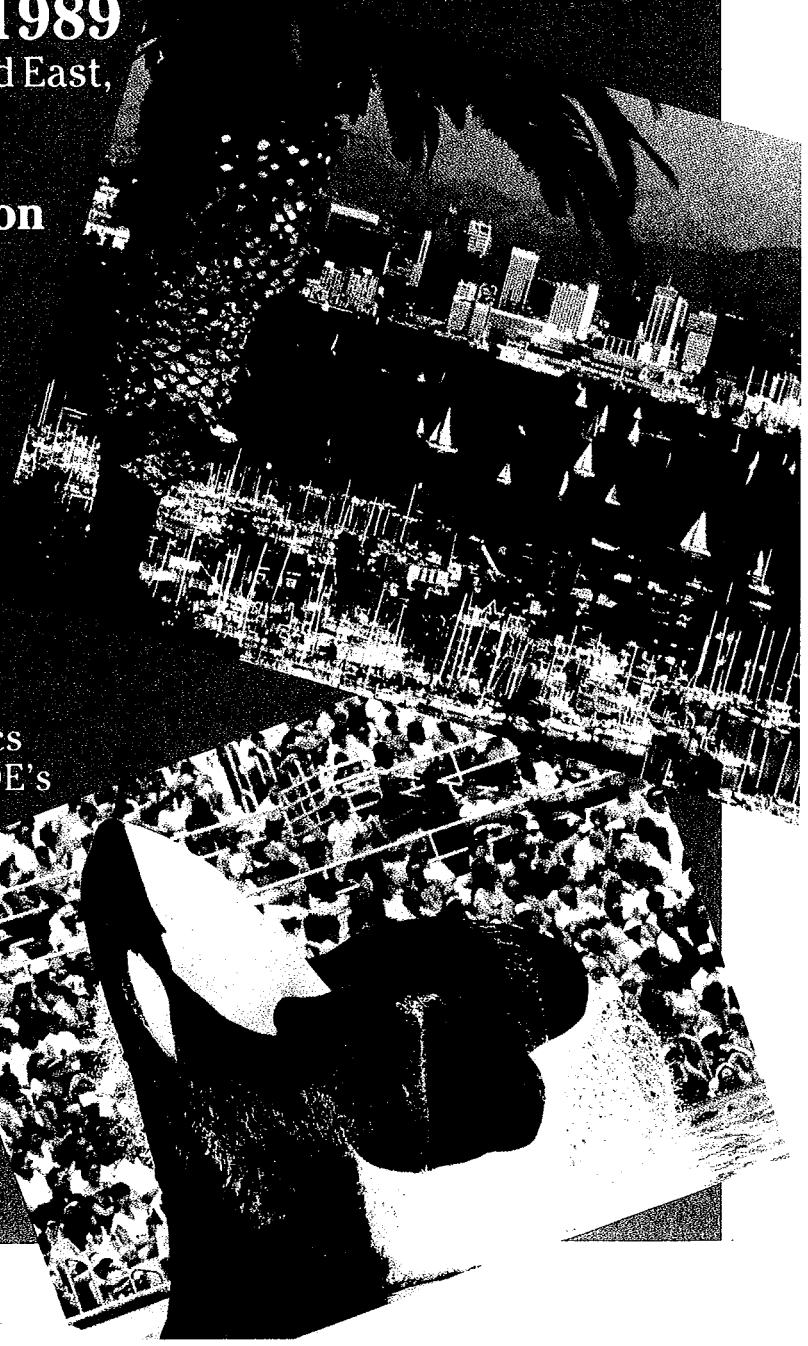
Sheraton Harbor Island East,
San Diego, California

And Short Course on Signal Processing

JULY 16, 1989

Meeting Themes

Parallel Computation
Numerical Analysis
Linear Algebra
Applied Mathematics
Computer Science
Discrete Mathematics
Nonlinear Fluid Dynamics
Numerical PDE's and ODE's
Scientific Computing
Inverse Problems
Signal Processing
AIDS Modeling
Optimization
Control
Dynamical Systems



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ORGANIZING COMMITTEE

James R. Bunch, *Co-chair*
University of California, San Diego
Randolph E. Bank, *Co-chair*
University of California, San Diego
Gene H. Golub
Stanford University
Thomas Kailath
Stanford University
Herbert B. Keller
California Institute of Technology

DEADLINE DATES

Hotel Reservations: June 23, 1989

Advance Meeting Registration: July 10, 1989

PROGRAM DESIGN: TOM JACKSON

SHORT COURSE

SHORT COURSE ON SIGNAL PROCESSING

July 16, 1989
Sheraton Harbor Island East
Palomar Room

Applied mathematicians, engineers, and other scientists interested in learning about (parallel) processing schemes used in modern signal processing should attend the short course that will be taught by Sailesh K. Rao, AT&T Bell Laboratories; Hanoch Lev-Ari (organizer), Stanford University; and James R. Bunch, University of California, San Diego. The main emphasis will be on the interplay between circuit theory and computational linear algebra in the context of constructing efficient and numerically robust parallel processing algorithms.

An overview of orthogonal filters, a systolic-array-like parallel processing architecture with diverse signal processing applications, will open the short course. The instructors will describe a systematic technique for mapping algorithms into processor arrays, which applies to a broad family of structured algorithms known as RIAs (Regular Iterative Algorithms). Systolic arrays and, in particular, orthogonal filters are included in the RIA family. The afternoon session will focus on the linear prediction application of orthogonal filters including a lecture that explores the relation between factorization/inversion of Toeplitz matrices and orthogonal filter architectures, and the extension of this relation to other structured matrices. This session will also address the numerical properties of orthogonal filters with special emphasis on the celebrated Schur and Levinson algorithms.

PROGRAM

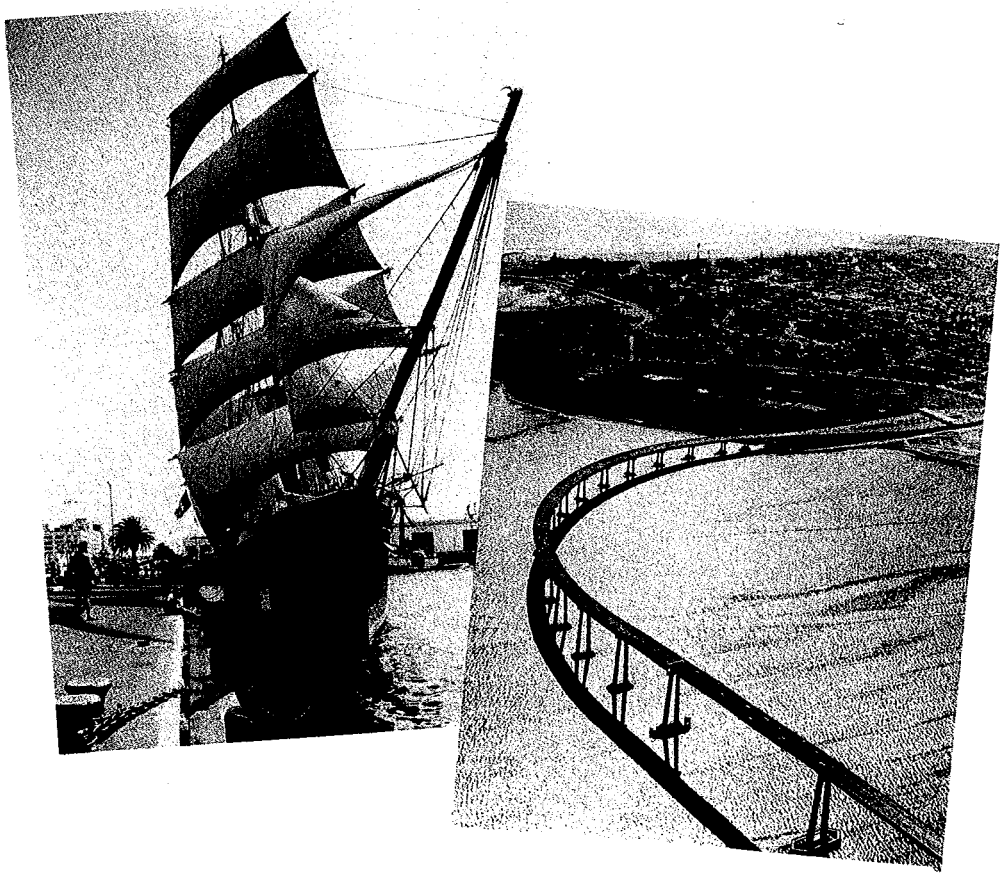
9:00 AM	**Lossless Arrays in Digital Filtering and Linear Prediction** *Hanoch Lev-Ari*
10:30 AM	Coffee and Discussion
11:00 AM	**Analysis and Synthesis of Parallel Processing Arrays** *Sailesh K. Rao*
12:30 PM	Lunch and Discussion
2:00 PM	**Structured Matrices and Efficient Algorithms for Linear Prediction** *Hanoch Lev-Ari*
3:30 PM	Coffee and Discussion
4:00 PM	**Numerical Properties of the Schur and Levinson Algorithms** *James R. Bunch*
5:30 PM	Discussion
6:00 PM	Adjournment

Registration Fees*

	SIAM Member	Non-Member	Student
Advance	$110	$130	$65
On-Site	$130	$150	$85

** Registration Fee for the Short Course includes preprints, coffee and lunch.*

Attendees should pre-register for the short course, as on-site registration cannot be guaranteed. Preprints of the lecture materials will be distributed upon check-in at the registration desk.



PRIZE LECTURES AND SPECIAL SESSIONS

Monday, July 17/2:00 PM
THE JAMES H. WILKINSON PRIZE IN NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING

Schur and Generalized Schur Forms: Algorithms and Applications

The lecturer will give an overview of numerical results related to the computation of special Schur and generalized Schur forms, from which one can retrieve the information of the Jordan and Kronecker canonical forms, respectively. These developments were all obtained in the last decade and were influenced for a large part by the work of Wilkinson.

These papers triggered a lot of research on the subject because of the fundamental importance of these decompositions in numerical linear algebra (eigenvalue and generalized eigenvalue problems); the wide range of applications (especially in multivariable control); the nice numerical properties of the "Schur" approach (stability and speed); and the fact that, after all, sensitivity issues related to these problems remain very complicated. A broad discussion of these topics will be given for a number of publications in the area.

Paul Van Dooren
Philips Research Laboratory, Brussels

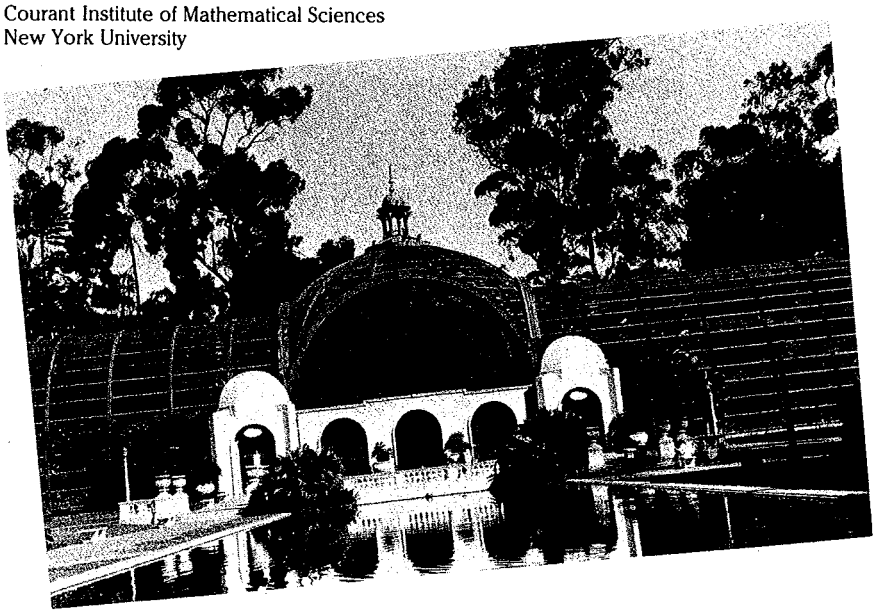
Tuesday, July 18/2:00 PM
THE THEODORE VON KARMAN PRIZE

Computational Models in Fusion Research

The tokamak is the primary candidate for a fusion reactor, but there is also interest in stellarators, which offer a better prospect for steady state operation. Three-dimensional computer codes have become widely accepted as a theoretical tool for the design of stellarators because complicated geometry makes any other analysis quite difficult.

Mathematical models describing equilibrium, stability and transport of the fusion plasma have been developed. The question of equilibrium and stability is treated by means of a variational principle in ideal magnetohydrodynamics. A controversy about the existence of solutions will be discussed. Also, a neoclassical theory of transport will be presented that includes systematic determination of the electric field.

Paul R. Garabedian
Courant Institute of Mathematical Sciences
New York University



Wednesday, July 19/10:30 AM
THE JOHN VON NEUMANN LECTURE

On the Foundations of Numerical Computation

The twenty-eighth recipient of The John von Neumann award will deal with the problem of increasing the understanding of algorithms by considering the foundations of numerical analysis and computer science.

He will discuss the schism between scientific computing and computer science from a theoretical perspective. These theoretical considerations have an intellectual importance when viewing the computer. In particular, the legitimacy and importance of models of machines that accept real numbers will be considered.

Stephen Smale
Department of Mathematics and Economics
University of California, Berkeley

Thursday, July 20/2:45 PM
MATHEMATICAL CONTEST IN MODELING AWARDS

The SIAM cosponsored Fifth Mathematical Contest in Modeling was held in February, with teams of three undergraduates devoting a weekend to modeling either of two applied problems. From among the teams judged outstanding, two SIAM graders selected one for a SIAM Award in special recognition of the quality of the team's solution. This award thus honors three students for excellence in collaborative mathematical modeling.

Wednesday, July 19/2:00 PM
SPECIAL LECTURE

The AIDS Epidemic, 1989

Quantitative mathematical methods — differential equations, statistical models and analysis — play a role in understanding and measuring the AIDS epidemic and the identified HIV virus carriers. This presentation focuses on these methods and looks at the biological and behavioral information required for modeling.

The speaker will examine recent growth history, discuss extrapolations of the data, and compare U.S. experience with that of other countries, including the data gathering process, the quality of the data, and the new surveys and channels for data availability. He also will report on the modeling efforts underway and plans for cooperative work among modelers, data collectors, biologists, and behavioral scientists.

James W. Curran, M.D., M.P.H.
Director, AIDS Program
Center for Infectious Diseases
Center for Disease Control, Atlanta

Thursday, July 20/2:00 PM
THE RETIRING PRESIDENT'S ADDRESS

Limits of Massive Parallelism in Differential Equations

Evolutionary differential equations describe systems that are characterized by information flow. In a simple initial value problem for ordinary differential equations, that flow is in the direction of integration. In a parabolic or hyperbolic partial differential equation, that flow is across space in increasing time.

Any numerical method has to model the flow of sufficient information to get the desired accuracy. This flow of information limits the possible parallelism, either because of communication required between processors or because of the need to wait for information to be computed before it can flow. The speaker examines these limits for two forms of parallelism — parallelism across space, in which each spatial point, or set of points, is handled by a different processor; and parallelism across time, in which each time point is handled by a different processor.

C. William Gear
Department of Computer Science
University of Illinois, Urbana

Monday, July 17/4:00 PM
ICEMAP SESSION

Trends and Opportunities in Federal Funding for the Mathematical Sciences

Federal funding for the mathematical sciences is expected to increase slowly in the years ahead. Support for some areas will increase, in others it will decrease. New areas of support are likely.

Agency representatives will review the results of recent major competitions and identify future opportunities for new research support and computer access.

Chair: Charles J. Holland
Air Force Office of Scientific Research
Washington, D.C.

(speakers to be announced)

MATH EDUCATION AND REFORM

Wednesday, July 19, 11:30 AM

Mathematical Training for Industrial Careers — What's Needed

The mathematical training of those coming to industry for careers as scientists and engineers, including those with only a first degree in mathematics, is generally adequate. "Generally," because formal training in statistics is often lacking, and there is widespread weakness in the ability of new graduates to apply their knowledge to practical problem solving. Less well recognized though, and consequently of greater impact, is the fact that nearly everyone at every level of job in industry must be able to routinely utilize less advanced mathematics, from arithmetic for balancing expense accounts to trigonometry for laying out work. The shortcomings in education here (as in the related area of preparing enough potential scientists and engineers for professional education) will also be discussed, and suggestions made.

John B. Walsh
Vice President and Chief Scientist
Boeing Military Airplane, Wichita

Wednesday, July 19, 3:15 PM

The National Game Plan for Math Education — What's Going On and How It Will Affect You

Transition in math education over the next decade "to meet the needs of students and the country as well as the accelerating momentum of a grass roots reform effort already under way" is the banner cry of leaders in the government and the community of mathematicians, engineers, scientists, and educators. The National Research Council through its Mathematical Sciences Education Board is conducting a strong program for college math to identify the appropriate goals and strategies to reach those goals. The National Council of Teachers of Mathematics has introduced a set of curriculum and evaluation standards for K-12 that is being promulgated now to the communities of math educators, school administrators, parents, and school board members. Millions of dollars are being spent to carry these projects through to fruition.

Applied mathematicians should recognize the importance of knowing about these programs and take steps to become involved in shaping them. These programs are likely to impact the applied mathematics profession in a profound way not yet recognized. The proactive participation of applied mathematicians is needed now, not passive observation.

The Total Program for Math Reform — The Changing Attitudes, Expectations, Curricula, and Teacher Education
Marcia P. Sward, *Executive Director*
Mathematical Sciences Education Board
National Research Council

The NCTM Push to a New K-12 Curriculum
John A. Dossey, *Past President*
National Council of Teachers of Mathematics
Illinois State University

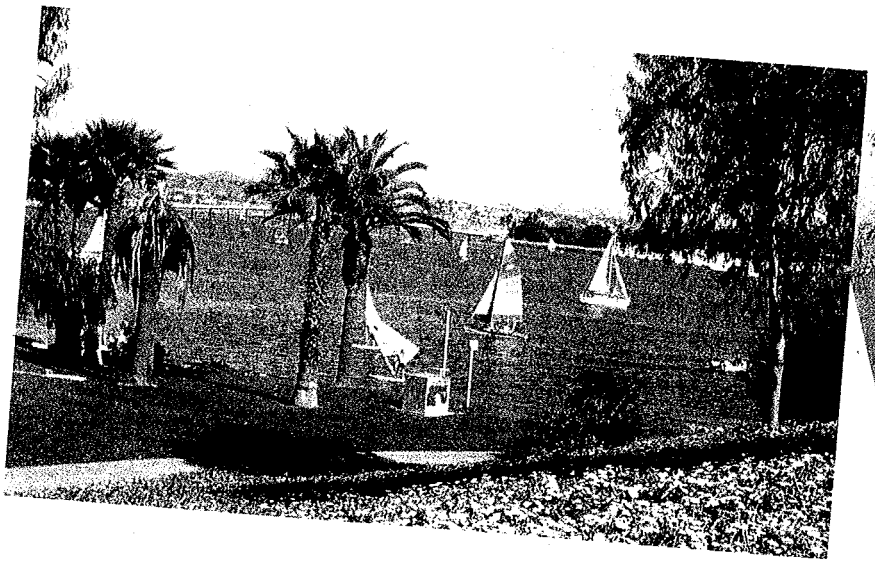
What's Being Done About Undergraduate Math
Lida K. Barrett, *President*
Mathematical Association of America
Mississippi State University

Thursday, July 20/3:00 PM

1989 SIAM ANNUAL BUSINESS MEETING

The annual business meeting of SIAM will be held on Thursday, July 20th at 3:00 PM in the Champagne Ballroom. This annual meeting is held for YOU, the members of SIAM, to afford you the opportunity to meet face-to-face with the officers you have elected to serve you. You will be apprised of SIAM's financial status, hear about our past successes, and be asked to participate in the future direction of our society.

This meeting will benefit all of us. We urge you to attend.



INVITED PRESENTATIONS

Monday, July 17/8:30 AM
Invited Presentation 1
Parallel Algorithms for Eigenvalue Problems

Commercially available parallel computers have provoked considerable research into parallel algorithms. One effective way to realize the impact of these computers is to restructure basic algorithms to take advantage of this new computing power. The benefit of such work is immediately felt in application codes that rely heavily on basic computations. Numerical Linear Algebra has certainly been an important source of such basic algorithms and will continue this role in the future. An important class of algorithms from Numerical Linear Algebra involves the solution of algebraic eigenvalue problems. Developing parallel algorithms suitable for eigenvalue problems has been one of the most challenging areas of research in this field.

The speaker will focus on a class of algorithms called divide and conquer methods. These techniques are based upon parallel decompositions constructed from low rank modifications of a matrix. The basic idea has been used to develop effective parallel algorithms for the symmetric algebraic eigenvalue problem, the singular value decomposition, and the unitary eigenvalue problem. However, algorithms of this type that would be suitable for more general classes of eigenvalue problems remain to be developed.

These new algorithms have provided a rich source of research problems in numerical analysis, mathematical software, and parallel programming methodology. This situation promises to endure as algorithms are developed for more general settings.

Danny C. Sorensen
Division of Mathematics and Computer Science
Argonne National Laboratory

Monday, July 17/9:15 AM
Invited Presentation 2
The Geometry of Ill-Conditioning

Potentially ill-conditioned numerical problems such as linear equation solving, polynomial zero finding, eigenvalue calculations, pole placement, or any problem whose solution is an algebraic function of the data will be considered. The speaker will describe a common paradigm for all these problems that gives a geometric description of the set of problems whose condition number is large, measures the likelihood that a random problem is ill- conditioned, and regularizes the problem to compute a satisfactory numerical solution.

The geometric description is based on the recognition that the condition number of the condition number is itself (or bounded by itself), which implies that ill-conditioned problems form narrow tubes about the set of problems whose condition number is infinite (the "ill-posed" problems). Regularization is achieved by projecting the problem onto the set of ill-posed ones and solving this constrained problem. This unifies and extends various techniques for least square problems and linear control theory.

James W. Demmel
Courant Institute of Mathematical Sciences
New York University

Tuesday, July 18/8:30 AM
Invited Presentation 3
Linear Algebra Problems Arising in Signal Processing

This survey of the role of linear algebra in modern signal processing describes both the computational needs and recent progress in parallel algorithms and architectures. The speaker will address representative areas of signal processing including beam forming, direction finding, spectrum analysis, pattern recognition, and time-frequency analysis.

For all of these areas, linear algebra and matrix computation play a central role in the modeling and analysis of the problem and real-time computational requirements. The computational requirements of these problems include a fairly complete set of linear algebra operations for dense matrices — matrix-vector multiplication, orthogonal triangular decomposition, the singular value decomposition (SVD), and the generalized SVD.

The speaker will show how the need for these computations arises in signal processing applications, and will survey recent developments in parallel algorithms and architectures for these tasks.

Jeffrey M. Speiser
Naval Ocean Systems Center, San Diego

Tuesday, July 18/9:15 AM
Invited Presentation 4
Displacement Structure of Matrices

Structured matrices arise in a variety of signal processing and control applications. For instance, Toeplitz matrices occur naturally in moment problems and in linear estimation of stationary processes; Hankel matrices occur in the modeling of linear systems and in decoding of error-correcting codes; Bezoutian matrices are used to locate zeros of polynomials and to solve certain approximation problems. Often such problems involve the completion of partially-specified structured matrices.

There are several known techniques for efficient manipulation of specific structured matrices, such as the Levinson algorithm for solving a system of Toeplitz equations and the Lanczos algorithm for Hankel equations. These two specific cases, as well as many others, give rise to the notion of displacement structure, which provides a conceptual framework for the derivation of 'universal' efficient algorithms for such matrices. The construction of an efficient algorithm for triangular factorization of structured matrices will be used to demonstrate the power of this comprehensive approach. It will also be shown that such algorithms generate cascade network models that can be used to solve a variety of structured matrix completion problems.

Hanoch Lev-Ari
Department of Electrical Engineering
Stanford University

Wednesday, July 19/8:30 AM
Invited Presentation 5
Why Geophysical Inverse Problems are Really Optimization Problems

In geophysics we attempt to model inaccessible underground structures from observations made at the Earth's surface. Most of these inverse problems are ill-posed and therefore we must avoid deceiving ourselves about the accuracy of our models whose interesting features may be merely accidental. Construction algorithms should always be formulated to suppress unnecessary detail that will otherwise obligingly present itself for interpretation. The simplest way to do this is to minimize a functional of the model, like a norm of the Laplacian, while matching the observations to a specified tolerance.

Robert L. Parker
Institute of Geophysics and Planetary Physics
University of California, San Diego

Wednesday, July 19/9:15 AM
Invited Presentation 6
Solitary Waves in Fluid Mechanics

Solitary waves have been observed to arise in many areas of fluid mechanics, and to sometimes play a considerable role in the long-term evolution of certain classes of fluid disturbances. Because of their stability and their ubiquitous nature, they have become an object of inquiry in their own right, as well as a tool used by a broad range of applied scientists.

The study of such phenomena simultaneously uses classical and recent mathematical techniques as well as modern computational and experimental tools. The lecture is intended to survey some of the modern discoveries in this domain.

Jerry L. Bona
Department of Mathematics
Pennsylvania State University

INVITED PRESENTATIONS

Thursday, July 20/8:30 AM
Invited Presentation 7
Domain Decomposition Methods for Partial Differential Equations

Domain Decomposition refers to a class of methods for solving partial differential equations. The main idea is to decompose the original domain into smaller subdomains, solve the original problem on the subdomains, and somehow "patch" the subdomain solutions to solve the original problem.

There are several reasons why such a procedure would be useful. First, irregular domains can be decomposed into regular subdomains on which more efficient solvers can be used. Second, it is a natural way to design parallel algorithms for PDEs. Third, it allows large problems to be solved on computers with relatively small core memory. Finally, different mathematical models and different grid resolutions can be adaptively used in different subdomains.

Domain Decomposition has been a popular research subject in the past several years. It is a topic that cuts across several disciplines: mathematics, computer science, and science and engineering. The lecturer will give a brief and unifying survey of the major approaches used in the literature, and indicate the current trends and future research directions. The emphasis will be on the design of effective algorithms, drawing on insights from each of the interdisciplinary areas.

Tony F. Chan
Department of Mathematics
University of California, Los Angeles

Thursday, July 20/9:15 AM
Invited Presentation 8
Iterative Methods for Nonsymmetric Linear Systems

This survey of recent developments in iterative methods for solving nonsymmetric linear systems will focus on two classes of methods. The first includes Chebychev-like polynomial methods that depend upon finding polynomials that are small on a set containing the spectrum of the linear system. The second class includes projection methods based on projecting the error onto the orthogonal compliment of a different subspace at each step. Projection methods provide a structure that includes a wide class of conjugate gradient-like methods such as the original conjugate gradient method, orthogonal error methods, Krylov projection methods and biconjugate gradients. Also, various forms of restarted and truncated methods will be discussed and an attempt will be made to expose open questions.

Thomas A. Manteuffel
University of Colorado, Denver; and Computing and Communications Division,
Los Alamos National Laboratory

Friday, July 21/8:30 AM
Invited Presentation 9
Stability of Vortex Patches

Complex laminar flows like the Karman vortex street behind a bluff body and turbulent flows like the mixing layer can be modeled as arrays of vortex patches. The geometry and evolution of the flows can be related to the dynamics and stability of the vortex patches. The speaker will discuss methods of analysis, such as representation by Schwarz functions and Hamiltonian methods. He will present results for both two- and three-dimensional disturbances.

The phenomenon of the filamentation of the boundaries of vortex patches will be reviewed. Results will be presented on the relation between the occurrence of filamentation and the existence of unstable finite amplitude waves on the vortex interfaces. It appears that filamentation does not always occur.

Philip G. Saffman
Department of Applied Mathematics
California Institute of Technology

Friday, July 21/9:15 AM
Invited Presentation 10
Knotted Vortex Filaments

Vortex filaments are usually defined as very thin loci in an ideal fluid or superfluid to which nonzero vorticity is confined. Other examples of vortex filaments are the points about which scroll waves in a reacting chemical medium rotate, the locus of nonoscillatory points in ventricular tachycardia or atrial flutter, or the points in the universe at which there is a phase singularity of the Higgs field (cosmic strings).

What is the dynamical behavior of a closed vortex filament? If the filament is circular this question is relatively easy to answer, but if the filament is knotted, very little is known about its behavior.

The goal of this talk is to discuss general methods by which the existence and dynamical behavior of closed knotted vortex filaments can be studied. All of the above examples except cosmic strings can have knotted filaments which move through their medium as rigid objects with a characteristic motion. Furthermore, the method, being quite general, can be applied in many physical contexts beyond those suggested here.

James P. Keener
Department of Mathematics
University of Utah, Salt Lake City

SOCIAL EVENTS

Welcoming Reception
Sunday, July 16, 8:00 PM - 10:00 PM
Chablis Room
Cash Bar

Beer Party
Monday, July 17, 6:15 PM - 8:00 PM
Harbor Terrace
Beer, assorted sodas, mini hamburgers, mini pizzas, hot dogs on a stick, chicken wings, fried zucchini and mushrooms, fresh fruit kabobs, chip and dip tray.
$15.00

Harbor Dinner Cruise
Wednesday, July 19, 6:30 PM - 9:30 PM
Enjoy the view of the city skyline as you cruise by the magnificent sights of the San Diego Harbor while listening to the melodic sounds of a piano. There will be a sit-down dinner served on the cruise consisting of dinner rolls, tossed salad with ranch dressing, New York strip steak cabernet, Italian baked tomato, carrots, chocolate mousse cake and wine. There will be a cash bar available for those wishing to purchase additional drinks. The boat will pick up and drop off passengers at the hotel.
$30.00

Stragglers Buffet
Friday, July 21, 6:30 PM
Harbor Terrace
This buffet is especially designed for those of you who will not be leaving until Saturday and yet want one more opportunity to get together with your colleagues. The buffet will consist of tossed salad, carrot and onion salad, pasta salad, vegetable crudite, vegetable lasagna, coq au vin, braised brisket of beef with piquash sauce, lyonnaise potatoes, stir fried vegetables, assorted pastries, bread and rolls and coffee, tea or milk. A cash bar will be available for any additional drinks.
$28.00

PROFESSIONAL SEMINARS

Tuesday, July 18/10:30 AM
Professional Seminar 1

FROM MANUSCRIPT TO BOUND BOOK — BECOMING A PUBLISHED AUTHOR

You've made the decision to write that book you've been thinking about for years. How do you find the publisher who will do the best job for you? What are your rights and responsibilities as an author? What is the production process all about? How will your book be marketed?

These and other questions will be answered by publishers' representatives who have worked closely with mathematicians for many years. You will be given suggestions that will make the publication of your book an enjoyable and exciting experience.

Chair: Vickie Kearn
SIAM, Philadelphia

Selecting a Publisher
Klaus Peters
Academic Press, Inc., Cambridge

Understanding the Contract
(to be presented by chair)
SIAM, Philadelphia

The Review Process
Edwin Beschler
Birkhauser Boston, Inc., Boston

Promotion and Marketing
Rudiger Gebauer
Springer-Verlag New York Inc., New York

The Production Process
Maria C. Taylor
John Wiley & Sons, Inc., New York

Tuesday, July 18/3:15 PM
Professional Seminar 2

WRITING, SPEAKING, COMMUNICATING TO GET ACCEPTANCE — ARE WE DOING A GOOD JOB?

Most applied mathematicians want their work recognized and used. Presenting that work effectively is essential to their success. While doing the "right" research and obtaining important results in paramount, it is almost as important to present the right material to the targeted audience in a style that is clear and easily understood.

Most mathematical presentations conform to a traditional style that has been adequate in a world where support for research and other mathematical work was readily obtained. Little attention has been given to presentations that win support. But, there is increasing competition for support and a proliferation of proposals, conferences, and publications where good work can be buried.

Presentations to win support are becoming an increasingly important component of the research effort, even more so for the "industrial mathematician" who must interact with engineers, scientists, and management. The speakers will examine some of the shortcomings in mathematical communications, and suggest some ways to improve them.

Chair: Donald E. Miller
Saint Mary's College, Notre Dame

Industry/Academe Communications — Needs and Opportunities
Edward F. Moyland
Ford Motor Co., Dearborn

Plain Writing — What's Needed and Why
I. Edward Block
SIAM, Philadelphia

Visual Aids — A Catalyst for Effective Presentations
Robert Nicholson
Boeing Computer Services, Seattle

It's Not an Art, But a Problem of Attitude & Training
(to be presented by Chair)

Thursday, July 20/10:30 AM
Professional Seminar 3

SUCCESS IN INDUSTRY — WHAT DOES IT TAKE?

What is "industrial mathematics?" For many, it is a way of life, not a branch of mathematics. Success in an industrial environment depends in part on having a strong mathematical foundation built with materials from an appropriate curriculum.

Just as important, however, are the right attitudes, good communication skills, a willingness to listen, and a healthy curiosity. Mathematical life in industry involves working with people in other fields and capacities — technical workers, managers and planners, sales people — and learning about a wide variety of products and processes.

The speakers will present their views of mathematical careers in industry — the various aspects of the industrial environment, the mathematical preparation needed for mathematical work in industry, and some guidelines for success.

Chair: Peter E. Castro, Eastman Kodak Company and Avner Friedman, Institute for Mathematics and Its Applications

The Various Mathematical Environments in Industry — Problem Solving, Research, Product Design, Strategic Planning
Lynn O. Wilson
AT&T Bell Laboratories, Murray Hill

Satisfying the Customer — The Need to Solve the Right Problem
Norman D. Winarsky
David Sarnoff Research Center, Princeton

Selling Yourself — Proposals, Presentations, Results
James L. Phillips
Boeing Computer Services, Seattle

Foundations for Success — The Right Curriculum, The Right Attitude
Peter E. Castro
Eastman Kodak Co., Rochester

MINISYMPOSIA

1. **Numerical Optimization**
(Sponsored by the SIAM Activity Group on Optimization)
Philip E. Gill
University of California, San Diego

2. **Programming Environments for Parallel Computing**
(Sponsored by the SIAM Activity Group on Supercomputing)
Jack J. Dongarra
Argonne National Laboratory

3. **Moving Grid Finite Element Methods**
Andy Wathen,
University of Bristol, United Kingdom, and Stanford University; and
Keith Miller, *University of California, Berkeley*

4. **Iterative Methods for Systems of Differential Equations**
Olavi Nevanlinna
Helsinki University of Technology, Finland

5. **Developments and Applications of New Ideas in Dynamical Systems: Progress in Recent Years – Part 1 of 2**
(Sponsored by the SIAM Activity Group on Dynamical Systems)
Henry Abarbanel
Scripps Institution of Oceanography and University of California, San Diego

6. **Combinatorial Algorithms and Software Design**
S. Gill Williamson
University of California, San Diego

7. **Iterative Methods for Solving Linear Systems on Parallel Machines**
Roland Freund
RIACS-NASA Ames Research Center

8. **Structured Problems in Numerical Linear Algebra**
William B. Gragg
Naval Postgraduate School

9. **Nonlinear Problems in Partial Differential Equations**
Hans Mittelmann
Arizona State University

10. **Singular Perturbation Theory**
Donald R. Smith
University of California, San Diego

11. **Influence of Architecture Upon Linear Algebra Algorithms**
(Sponsored by the SIAM Activity Group on Linear Algebra)
Robert C. Ward
Oak Ridge National Laboratory

12. **Large-Scale Optimization**
(Sponsored by the SIAM Activity Group on Optimization)
Paul T. Boggs
National Institute of Standards and Technology; and
Robert B. Schnabel
University of Colorado, Boulder

13. **Algorithms for Simulation of VLSI Devices and Circuits**
William M. Coughran, Jr.
AT&T Bell Laboratories

14. **Interpolation of Two-Dimensional Signal from Nonuniform Samples**
Farokh Marvasti
Illinois Institute of Technology

15. **Semidiscretizations of PDEs Using Adaptive Method of Lines and Its Effect on the ODE Solver**
Kris Stewart, *San Diego State University*

16. **Mathematical Aspects of Neural Computing**
George Cybenko
University of Illinois, Urbana

17. **Optimal Preconditioning**
Thomas A. Manteuffel
Los Alamos National Laboratory

18. **Combinatorial Optimization**
(Sponsored by the SIAM Activity Group on Discrete Mathematics)
T. C. Hu and C. H. Papadimitriou
University of California, San Diego

19. **Nonlinear Problems in Mathematical Combustion Theory**
Stephen B. Margolis
Sandia National Laboratories, Livermore, CA
Jose Vega
Universidad Politecnica de Madrid, Spain; and Bernard J. Matkowsky
Northwestern University

20. **Numerical Linear Algebra in Control and Signal Processing**
(Sponsored by the SIAM Activity Group on Linear Algebra)
Biswa Nath Datta
Northern Illinois University

21. **Modeling the Epidemiology of Aids**
Herbert W. Hethcote
University of Iowa

22. **Linear Algebra in Control and Systems Theory – Part 1 of 2**
(Sponsored by the SIAM Activity Group on Control and Systems Theory)
Alan J. Laub
University of California, Santa Barbara; and
Paul Van Dooren, *Philips Research Laboratory, Brussels, Belgium*

23. **Multilevel Adaptive Methods**
Steve McCormick
University of Colorado, Denver

24. **Recent Developments in Numerical Methods for Discontinuous Solutions to Hyperbolic Problems**
Edward Harabetian
University of Michigan, Ann Arbor; and
M. Brio, *University of Arizona*

25. **Complexity of Data Structures**
Michael L. Fredman
Bell Communications Research

26. **Applications of Parallel Computers to Problems in Computational Fluid Dynamics**
Ian A. Taylor, *Intel Scientific Computers*

27. **Signal Processing Algorithms**
Jeffrey M. Speiser
Naval Ocean Systems Center, San Diego

28. **Numerical Linear Algebra in Systems and Control Theory – Part 2 of 2**
(Sponsored by the SIAM Activity Group on Control and Systems Theory)
Alan J. Laub
University of California, Santa Barbara; and
Paul Van Dooren, *Philips Research Laboratory, Brussels, Belgium*

29. **Developments and Applications of New Ideas in Dynamical Systems: Progress in Recent Years – Part 2 of 2**
(Sponsored by the SIAM Activity Group on Dynamical Systems)
Celso Grebogi
University of Maryland, College Park; and
Bernard J. Matkowsky
Northwestern University

30. **Scientific Programming Environments**
William M. Coughran, Jr., and Eric Grosse
AT&T Bell Laboratories

31. **Linear Algebra for Massively Parallel Processors**
Danny C. Sorensen
Argonne National Laboratory

32. **Control and Modeling of Nonlinear Systems**
J. William Helton
University of California, San Diego

33. **Pharmacokinetics**
(Sponsored by the SIAM Activity Group on Linear Algebra)
Pamela G. Coxson
Lawrence Berkeley Laboratory

34. **Perturbation Methods for Strongly Nonlinear Oscillators**
Richard Haberman
Southern Methodist University

35. **Mathematical Contest in Modeling (MCM) — Modeling at the Undegraduate Level**
Ben Fusaro, *Salisbury State University*

36. **Applications of Front Tracking**
Alexandre J. Chorin
University of California, Berkeley; and
James G. Glimm
Courant Institute of Mathematical Sciences, New York University

37. **Conditional Event Algebras and Conditional Probability Computations**
I. R. Goodman
Naval Ocean Systems Center

38. **Discrete Mathematical Structures in Reliability**
(Sponsored by the SIAM Activity Group on Discrete Mathematics)
Douglas B. Shier
College of William and Mary

39. **Exactly Solvable Nonlinear Evolution Equations**
Mark J. Ablowitz, *Clarkson University*

40. **Graphs as Measures of Network Vulnerability**
(Sponsored by the SIAM Activity Group on Discrete Mathematics)
Richard D. Ringeisen, *Clemson University*

41. **Domain Decomposition and Applications**
(Sponsored by the SIAM Activity Group on Supercomputing)
Wlodek Proskurowski
University of Southern California

42. **Nonconforming and Non-nested Multigrid Methods**
Ridgway Scott
Pennsylvania State University

43. **Problems from Industry Brought to Math Clinics**
Ellis Cumberbatch
The Claremont Graduate School

44. **Matrices and Optimization**
(Sponsored by the SIAM Activity Group on Linear Algebra)
David Carlson
San Diego State University; and
Henry Wolkowicz
University of Waterloo, Canada

45. **Numerical Methods in Plasma Physics**
F. Joanne Helton
General Atomics, San Diego, CA

PROGRAM AT-A-GLANCE

Saturday, July 15/PM

5:00 PM/Champagne Ballroom
Registration opens for Short Course

9:00 PM/Champagne Ballroom
Registration closes for Short Course

Sunday, July 16/AM

8:00 AM/Champagne Ballroom
Registration opens for Short Course

9:00 AM/Palomar
Lossless Arrays in Digital Filtering and Linear Prediction
Hanoch Lev-Ari
Stanford University

10:30 AM/Mission Court South
Coffee

11:00 AM/Palomar
Analysis and Synthesis of Parallel Processing Arrays
Sailesh K. Rao
AT&T Bell Laboratories

Sunday, July 16/PM

12:30 PM/Laguna
Lunch

2:00 PM/Palomar
Structured Matrices and Efficient Algorithms for Linear Prediction
Hanoch Lev-Ari
Stanford University

3:30 PM/Mission Court South
Coffee

4:00 PM/Palomar
Numerical Properties of the Schur and Levinson Algorithms
James R. Bunch
University of California, San Diego

5:00 PM/Champagne Ballroom
Registration opens for Meeting

8:00 PM/Chablis Room
Welcoming Reception

8:00 PM/Champagne Ballroom
Registration closes for Meeting

Monday, July 17/AM

7:30 AM/Champagne Ballroom
Registration Opens

8:15 AM/Champagne Ballroom
Opening Remarks

8:30 AM/Champagne Ballroom
Invited Presentations 1 and 2
Chair: Randolph E. Bank
University of California, San Diego

8:30 AM
Parallel Algorithms for Eigenvalue Problems
Danny C. Sorensen
Argonne National Laboratory

9:15 AM
The Geometry of Ill-Conditioning
James Demmel
Courant Institute of Mathematical Sciences, New York University

10:00 AM/Exhibit Hall
Coffee

*10:30 AM/*CONCURRENT SESSIONS

Minisymposium 1/Champagne Ballroom
Numerical Optimization
(Sponsored by the SIAM Activity Group on Optimization)
Chair: Philip E. Gill
University of California, San Diego

Minisymposium 2/Chablis
Programming Environments for Parallel Computing
(Sponsored by the SIAM Activity Group on Supercomputing)
Chair: Jack J. Dongarra
Argonne National Laboratory

Minisymposium 3/Cuyamaca
Moving Grid Finite Element Methods
Chair: Andrew Wathen
University of Bristol, U.K.

Minisymposium 4/Mission Court South
Iterative Methods for Systems of Differential Equations
Chair: Olavi Nevanlinna
Helsinki University of Technology, Espoo, Finland

Minisymposium 5/Cabernet
Developments and Applications of New Ideas in Dynamical Systems: Progress in Recent Years 1
(Sponsored by the SIAM Activity Group on Dynamical Systems)
Chair: Henry Abarbanel
Scripps Institution of Oceanography, University of California, San Diego

Minisymposium 6/Rose
Combinatorial Algorithms and Software Design
Chair: S. Gill Williamson
University of California, San Diego

Contributed Presentations 1/Laguna
Preconditioning and Conjugate Gradients
Chair: Steve F. Ashby
Lawrence Livermore National Laboratory

Contributed Presentations 2/Chenin
Computer Science 1
Chair: Keith Humenik
University of Maryland, Baltimore

Monday, July 17/PM

12:30 PM
Lunch

2:00 PM/Champagne Ballroom
The James H. Wilkinson Prize in Numerical Analysis and Scientific Computing
Chair: Gene H. Golub
Stanford University

Schur and Generalized Schur Forms: Algorithms and Applications
Paul Van Dooren
Philips Research Laboratory, Brussels

2:45 PM/Exhibit Hall
Coffee

*3:15 PM/*CONCURRENT SESSIONS

Minisymposium 7/Cuyamaca
Iterative Methods for Solving Linear Systems on Parallel Machines
Chair: Roland Freund
RIACS-NASA Ames Research Center

Minisymposium 8/Laguna
Structured Problems in Numerical Linear Algebra
Chair: William B. Gragg
Naval Postgraduate School

Minisymposium 9/Mission Court South
Nonlinear Problems in Partial Differential Equations
Chair: Hans Mittelmann
Arizona State University

Minisymposium 10/Rose
Singular Perturbation Theory
Chair: Donald R. Smith
University of California, San Diego

Contributed Presentations 3/Champagne Ballroom
Parallel Numerical Linear Algebra 1
Chair: Robert Schreiber
RIACS-NASA Ames Research Center

Contributed Presentations 4/Chablis
Fluid Mechanics
Chair: Sherwood Samn
USAF School of Aerospace Medicine

Contributed Presentations 5/Cabernet
Systems and Control
Chair: Narayan C. Debnath
University of Wisconsin, River Falls

Contributed Presentations 6/Chenin
Optimization Methodologies
Chair: Walter Murray
Stanford University

4:00 PM/Gamay Riesling Room
ICEMAP Session (the Interagency Committee for Extramural Mathematics Programs)

Trends and Opportunities in Federal Funding for the Mathematical Sciences
Chair: Charles J. Holland
Air Force Office of Scientific Research, Washington

6:15 PM/Harbor Terrace
SIAM Beer Party

PROGRAM AT-A-GLANCE

Tuesday, July 18/AM

8:30 AM/Champagne Ballroom
Invited Presentations 3 and 4
Chair: James R. Bunch
University of California, San Diego

8:30 AM
Linear Algebra Problems Arising in Signal Processing
Jeffrey M. Speiser
Naval Ocean Systems Center, San Diego

9:15 AM
Displacement Structure of Matrices
Hanoch Lev-Ari
Stanford University

10:00 AM/Exhibit Hall
Coffee

*10:30 AM/*CONCURRENT SESSIONS

Professional Seminar 1/Gamay Riesling Room
From Manuscript to Bound Book—Becoming a Published Author
Chair: Vickie Kearn
SIAM, Philadelphia

Minisymposium 11/Champagne Ballroom
Influence of Architecture Upon Linear Algebra Algorithms
(Sponsored by the SIAM Activity Group on Linear Algebra)
Chair: Robert C. Ward
Oak Ridge National Laboratory

Minisymposium 12/Chablis
Large-Scale Optimization
(Sponsored by the SIAM Activity Group on Optimization)
Chair: Paul T. Boggs, National Institute of Standards and Technology; and Robert B. Schnabel, University of Colorado, Boulder

Minisymposium 13/Mission Court South
Algorithms for Simulation of VLSI Devices and Circuits
Chair: William M. Coughran, Jr.
AT & T Bell Laboratories

Minisymposium 14/Cabernet
Interpolation of Two-Dimensional Signals from Nonlinear Samples
Chair: Farokh A. Marvasti
Illinois Institute of Technology

Minisymposium 15/Rose
Semidiscretizations of PDE's Using Adaptive Methods of Lines and It's Effect on the ODE Solver
Chair: Kris W. Stewart
San Diego State University

Minisymposium 16/Chenin
Mathematical Aspects of Neural Computing
Chair: George Cybenko
University of Illinois, Urbana

Contributed Presentations 7/Cuyamaca
Computational Fluid Dynamics 1
Chair: Joseph F. McGrath
KMS Fusion, Inc., Ann Arbor

Contributed Presentations 8/Laguna
Numerical Linear Algebra 1
Chair: Ake Bjorck
Linkoping University, Sweden

Tuesday, July 18/PM

12:30 PM
Lunch

2:00 PM/Champagne Ballroom
The Theodore von Karman Prize
Chair: Marshall P. Tulin
University of California, Santa Barbara

Computational Models in Fusion Research
Paul R. Garabedian
Courant Institute of Mathematical Sciences, New York University

2:45 PM/Exhibit Hall
Coffee

*3:15 PM/*CONCURRENT SESSIONS

Professional Seminar 2/Gamay Riesling Room
Writing, Speaking, Communicating to Get Acceptance—Are We Doing A Good Job?
Chair: Donald E. Miller
Saint Mary's College, Notre Dame

Minisymposium 17/Cuyamaca
Optimal Preconditioning
Chair: Thomas A. Manteuffel
Los Alamos National Laboratory

Minisymposium 18/Mission Court South
Combinatorial Optimization
(Sponsored by the SIAM Activity Group on Discrete Mathematics)
Chair: T. C. Hu and C. H. Papadimitriou
University of California, San Diego

Minisymposium 19/Cabernet
Nonlinear Problems In Mathematical Combustion Theory
Chair: Stephen B. Margolis
Sandia National Laboratories

Minisymposium 20/Rose
Numerical Linear Algebra in Control and Signal Processing
(Sponsored by the SIAM Activity Group on Linear Algebra)
Chair: Biswa Nath Datta
Northern Illinois University

Contributed Presentations 9/Champagne Ballroom
Computational Fluid Dynamics 2
Chair: David Canright
Naval Postgraduate School

Contributed Presentations 10/Chablis
PDE's 1
Chair: David H. Carlson
San Diego State University

Contributed Presentations 11/Laguna
Signal Processing
Chair: Gilbert Strang
Massachusetts Institute of Technology

Contributed Presentations 12/Chenin
Statistics and Probability
Chair: John A. Morrison
AT&T Bell Laboratories, Murray Hill

Wednesday, July 19/AM

8:30 AM/Champagne Ballroom
Invited Presentations 5 and 6
Chair: Philip E. Gill
University of California, San Diego

8:30 AM
Why Geophysical Inverse Problems Are Really Optimization Problems
Robert L. Parker
University of California, San Diego

9:15 AM
Solitary Waves in Fluid Mechanics
Jerry L. Bona
Pennsylvania State University

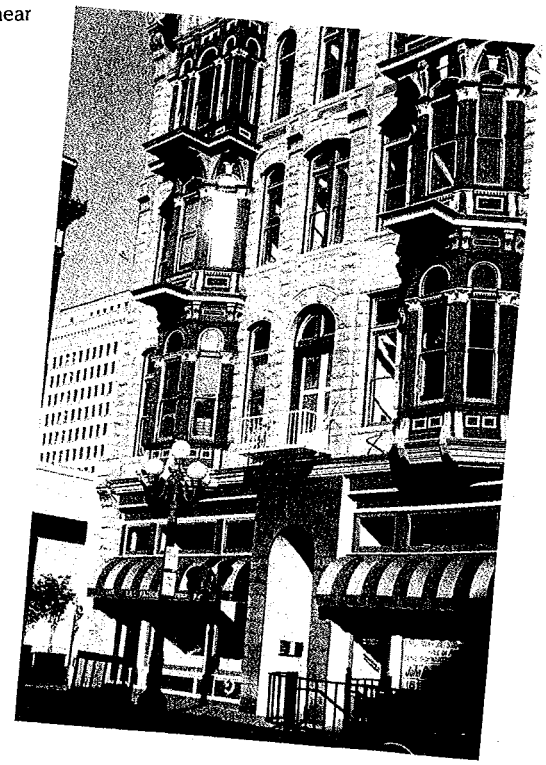
10:00 AM/Exhibit Hall
Coffee

10:30 AM/Champagne Ballroom
The John von Neumann Lecture
Chair: Ivar Stakgold
University of Delaware, Newark

On the Foundations of Numerical Computation
Stephen Smale
University of California, Berkeley

11:30 AM/Champagne Ballroom
Special Session on Math Education for Industry

Mathematical Training for Industrial Careers—What's Needed
John B. Walsh
Boeing Military Airplane, Wichita



PROGRAM AT-A-GLANCE

Wednesday, July, 19/PM

12:30 PM
Lunch

2:00 PM/Champagne Ballroom
Special Lecture
Chair: Hirsh Cohen
IBM-T.J. Watson Research Center

The AIDS Epidemic, 1989
James W. Curran, M.D., M.P.H
Center for Infectious Diseases, Center for Disease Control, Atlanta

2:45 PM/Exhibit Hall
Coffee

*3:15 PM/*CONCURRENT SESSIONS

Special Session on Math Reform*/Gamay Riesling Room*
The National Game Plan for Math Education — What's Going On and How It Will Affect You
Chair: Marcia P. Sward
Mathematical Sciences Education Board
National Research Council

Minisymposium 21/Champagne Ballroom
Modeling the Epidemiology of AIDS
Chair: Herbert W. Hethcote
University of Iowa

Minisymposium 22/Chablis
Linear Algebra in Control and Systems Theory 1
(Sponsored by the SIAM Activity Group on Control and Systems Theory)
Chair: Alan J. Laub, University of California, Santa Barbara; and Paul Van Dooren, Philips Research Laboratory, Brussels

Minisymposium 23/Cuyamaca
Multilevel Adaptive Methods
Chair: Steve McCormick
University of Colorado, Denver

Minisymposium 24/Cabernet
Recent Developments in Numerical Methods for Discontinuous Solutions to Hyperbolic Problems
Chair: Edward Harabetian, University of Michigan, Ann Arbor; and M. Brio, University of Arizona, Tucson

Minisymposium 25/Rose
Complexity of Data Structures
Chair: Michael L. Fredman
Bell Communications Research

Contributed Presentations 13/Laguna
Parallel PDE's
Chair: William D. Gropp
Yale University

Contributed Presentations 14/Mission Court South
Computational Fluid Dynamics 3
Chair: Calvin J. Ribbens
Virginia Polytechnic Institute and State University

Contributed Presentations 15/Chenin
Discrete Mathematics
Chair: Narayan C. Debnath
University of Wisconsin, River Falls

6:30 PM/Hotel Lobby
Leave for Harbor Dinner Cruise

Thursday, July 20/AM

8:30 AM/Champagne Ballroom
Invited Presentations 7 and 8
Chair: Gene H. Golub
Stanford University

8:30 AM
Domain Decomposition Methods for Partial Differential Equations
Tony F. Chan
University of California, Los Angeles

9:15 AM
Iterative Methods for Nonsymmetric Linear Systems
Thomas A. Manteuffel
University of Colorado, Denver and Los Alamos National Laboratory

10:00 AM/Exhibit Hall
Coffee

*10:30 AM/*CONCURRENT SESSIONS

Professional Seminar 3/Gamay Riesling Room
Success in Industry — What Does It Take?
Chair: Peter E. Castro, Eastman Kodak Company; and Avner Friedman, Institute for Mathematics and Its Applications

Minisymposium 26/Champagne Ballroom
Applications of Parallel Computers to Problems in Computational Fluid Dynamics
Chair: Ian A. Taylor
Intel Scientific Computers

Minisymposium 27/Chablis
Signal Processing Algorithms
Chair: Jeffrey M. Speiser
Naval Ocean Systems Center, San Diego

Minisymposium 28/Cuyamaca
Numerical Linear Algebra in Systems and Control Theory 2
(Sponsored by the SIAM Activity Group on Control and Systems Theory)
Chair: Alan J. Laub, University of California, Santa Barbara; and Paul Van Dooren, Philips Research Laboratory, Brussels

Minisymposium 29/Laguna Room
Developments and Applications of New Ideas in Dynamical Systems: Progress in Recent Years 2
(Sponsored by the SIAM Activity Group on Dynamical Systems)
Chair: Celso Grebogi, University of Maryland, College Park; and Bernard J. Matkowsky, Northwestern University

Minisymposium 30/Cabernet
Scientific Programming Environments
Chair: William M. Coughran Jr., and Eric Grosse
AT&T Bell Laboratories

Contributed Presentations 16/Mission Court South
ODE's 1
Chair: Kris W. Stewart
San Diego State University

Contributed Presentations 17/Chenin
O.R./Economics
Chair: Chin W. Yang
Clarion University of Pennsylvania

Thursday, July 20/PM

12:30 PM
Lunch

2:00 PM/Champagne Ballroom
The Retiring President's Address

Limits of Massive Parallelism in Differential Equations
C. William Gear
University of Illinois, Urbana

2:45 PM/Champagne Ballroom
MCM Prize Presentations
Chair: James W. Daniel
University of Texas, Austin

3:00 PM/Champagne Ballroom
1989 SIAM Business Meeting

3:30 PM/Exhibit Hall
Coffee

*3:45 PM/*CONCURRENT SESSIONS

Minisymposium 31/Champagne Ballroom
Linear Algebra for Massively Parallel Processors
Chair: Danny C. Sorensen
Argonne National Laboratory

Minisymposium 32/Laguna
Control and Modeling of Nonlinear Systems
Chair: J. William Helton
University of California, San Diego

Minisymposium 33/Mission Court South
Pharmacokinetics
(Sponsored by the SIAM Activity Group on Linear Algebra)
Chair: Pamela G. Coxson
Lawrence Berkeley Laboratory

Minisymposium 34/Cabernet
Perturbation Methods for Strongly Nonlinear Oscillators
Chair: Richard Haberman
Southern Methodist University

Minisymposium 35/Rose
Mathematical Contest in Modeling (MCM) — Modeling at the Undergraduate Level
Chair: Ben Fusaro
Salisbury State University ,

Contributed Presentations 18/Chablis
Optimal Control
Chair: Jose E. Castillo
San Diego State University

Contributed Presentations 19/Cuyamaca
Dynamical Systems/Mechanics
Chair: Donald R. Smith
University of California, San Diego

Contributed Presentations 20/Chenin
Numerical Analysis
Chair: Jean-Paul Berrut
Universite de Fribourg, Switzerland

Poster Session 1*/Exhibit Hall*

PROGRAM AT-A-GLANCE

Friday, July 21/AM

8:30 AM/Champagne Ballroom
Invited Presentations 9 and 10
Chair: Herbert B. Keller
California Institute of Technology

8:30 AM
Stability of Vortex Patches
Philip. G. Saffman
California Institute of Technology

9:15 AM
Knotted Vortex Filaments
James P. Keener
University of Utah, Salt Lake City

10:00 AM/Exhibit Hall
Coffee

*10:30 AM/*CONCURRENT SESSIONS

Minisymposium 36/Champagne Ballroom
Applications of Front Tracking
Chair: Alexandre J. Chorin, University of California, Berkeley; and James G. Glimm, Institute of Mathematical Sciences, New York University

Minisymposium 37/Cuyamaca
Conditional Event Algebras and Conditional Probability Computations
Chair: I.R. Goodman
Naval Ocean Systems Center, San Diego

Minisymposium 38/Mission Court South
Discrete Mathematical Structures in Reliability
(Sponsored by the SIAM Activity Group on Discrete Mathematics)
Chair: Douglas R. Shier
College of William and Mary

Minisymposium 39/Cabernet
Exactly Solvable Nonlinear Evolution Equations
Chair: Mark J. Ablowitz
Clarkson University

Minisymposium 40/Rose
Graphs as Measures of Network Vulnerability
(Sponsored by the SIAM Activity Group on Discrete Mathematics)
Chair: Richard D. Ringeisen
Clemson University

Contributed Presentations 21/Chablis
Numerical Linear Algebra 2
Chair: Lloyd N. Trefethen
Massachusetts Institute of Technology

Contributed Presentations 22/Laguna
ODE's 2
Chair: Kris W. Stewart
San Diego State University

Contributed Presentations 23/Chenin
Computer Science 2
Chair: Rod Fatoohi
NASA Ames Research Center

Friday, July 21/PM

12:30 PM
Lunch

*2:00 PM/*CONCURRENT SESSIONS

Minisymposium 41/Cuyamaca
Domain Decomposition and Applications
(Sponsored by the SIAM Activity Group on Supercomputing)
Chair: Wlodek Proskurowski
University of Southern California

Minisymposium 42/Laguna
Nonconforming and Non-Nested Multigrid Methods
Chair: L. Ridgway Scott
Pennsylvania State University

Minisymposium 43/Mission Court South
Problems from Industry Brought to Math Clinics
Chair: Ellis Cumberbatch
Claremont Graduate School

Minisymposium 44/Cabernet
Matrices and Optimization
(Sponsored by the SIAM Activity Group on Linear Algebra)
Chair: David H. Carlson, San Diego State University; and Henry Wolkowicz, University of Waterloo, Canada

Minisymposium 45/Chenin
Numerical Methods in Plasma Physics
Chair: F. Joanne Helton
General Atomics, Inc., San Diego

Contributed Presentations 24/Champagne Ballroom
Parallel Numerical Linear Algebra 2
Chair: Jean-Paul Berrut
Universite de Fribourg, Switzerland

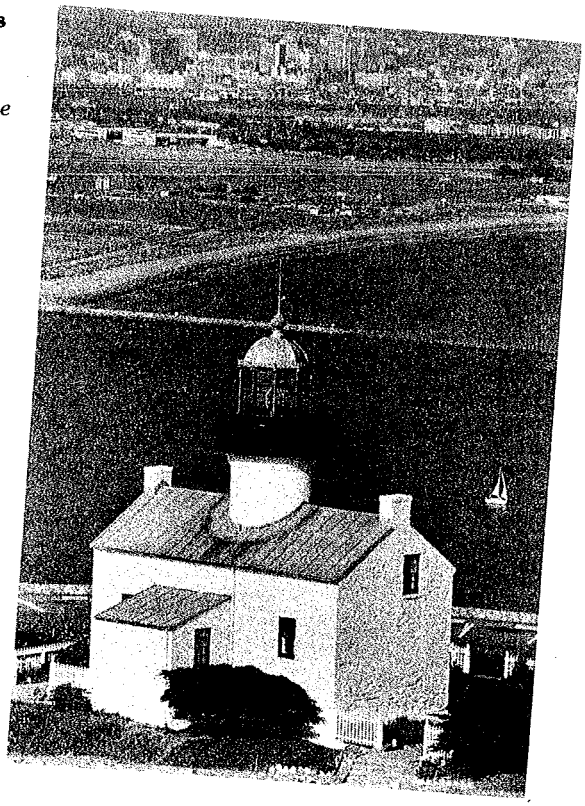
Contributed Presentations 25/Chablis
PDE's 2
Chair: Gregory A. Kriegsmann
Northwestern University

Contributed Presentations 26/Rose
Analysis
Chair: David J. Muraki
Northwestern University

Poster Session 2*/Exhibit Hall*

*5:00 PM/*Meeting Adjourns

6:30 PM/Harbor Terrace
Stragglers Buffet



MINISYMPOSIA

Monday, July 17/10:30 AM
Minisymposium 1/Champagne Ballroom
NUMERICAL OPTIMIZATION
(Sponsored by the SIAM Actitivty Group on Optimization)

The first widespread use of numerical optimization arose in meeting operational needs during World War II. Since then, dramatic improvements in both advanced optimization techniques and high-performance computers have resulted in the successful application of numerical optimization to a wide variety of areas ranging from engineering design to financial planning. One aspect of the success of numerical optimization has been the ability to solve ever-larger problems with ever-increasing speed. This minisymposium will highlight some recent developments in optimization that promise to continue this advance on the latest generation of high-performance computers. Two featured areas are barrier-function methods, which have been the subject of renewed interest since the publication of Karmarkar's seminal paper in 1984, and methods designed for machines with vector and parallel architectures.

Organizer: Philip E. Gill
University of California, San Diego

Linear Programming Techniques for Vector Computers
Samuel K. Eldersveld, Stanford University

Preconditioners for the Solution of Very Large Unconstrained Optimization Problems
Jorge Nocedal, Northwestern University

Feasibility Issues in an Interior Point Method for Linear Programming
Irvin Lustig, Princeton University

A Dual Barrier Method for Linear Programming Using LU Preconditioning
Michael A. Saunder, Stanford University

Monday, July 17/10:30 AM
Minisymposium 2/Chablis Room
PROGRAMMING ENVIRONMENTS FOR PARALLEL COMPUTING
(Sponsored by the SIAM Activity Group on Supercomputing)

For most computational problems, the design and implementation of an efficient parallel solution is a formidable intellectual challenge. Since parallel computation is still in its infancy, we often do not understand what algorithms to use, much less how to implement them efficiently on specific parallel machines. With existing technology, the construction of a parallel program is a laborious, largely manual enterprise that forces the programmer to assume responsibility for determining a suitable mathematical algorithm and translating it into an intricately coordinated set of instructions tuned to a particular parallel machine.

Efficient parallel programs are much more difficult to write than efficient sequential programs, because the behavior of parallel programs is nondeterministic. They are also much less portable, because the structure of efficient parallel programs critically depends on specific architectural features of the underlying hardware (such as the structure of the memory hierarchy). To make effective use of parallel machines in scientific research, we must develop high-level languages and environments for producing efficient parallel solutions to scientific problems.

Organizer: Jack J. Dongarra
Argonne National Laboratory

SCHEDULE: An Aid to Programming Explicitly Parallel Algorithms in Fortran
(To be presented by the Organizer)

A Unified Approach to Parallel Programming
J. C. Browne, Muhammed Azam, and Steve Sobek, University of Texas, Austin

The Poker Approach to Parallel Programming
Lawrence Snyder, University of Washington, Seattle

Environments for Performance Evaluation
Allen D. Malony, University of Illinois, Urbana

Monday, July 17/10:30 AM
Minisymposium 3/Cuyamaca Room
MOVING GRID FINITE ELEMENT METHODS

Many partial differential equation systems which arise as models of different physical processes admit solutions with sharp moving features. For time- dependent problems, regions of large gradients or high curvature may propagate and distort - it is generally these significant features of a solution that need to be modelled accurately in any numerical simulation. Fixed, preassigned grids are often inappropriate for such problems; an alternative approach is to use numerical methods based on continuously deforming grids.

This session concerns the development, analysis and application of finite element methods on moving grids for various types of evolutionary partial differential equations. The emphasis will be on problems in two space dimensions.

Organizers: Andy Wathen (Chair), University of Bristol, U.K., and Stanford University; and Keith Miller, University of California, Berkeley

Implicit and Explicit Gradient Weighted Moving Finite Elements in Multidimensions
Keith Miller, University of California, Berkeley

Adaptive H-, P-, and R-Refinement Finite Element Schemes for Parabolic Partial Differential Systems
Joseph E. Flaherty, and Yu Wang, Rensselaer Polytechnic Institute

Moving Finite Elements and the Legendre Transformation
M. J. Baines, University of Reading, U. K.

High Order Moving Grid Finite Element Methods
P. K. Jimack, University of Bristol, U. K.

Monday, July 17/10:30 AM
Minisymposium 4/Mission Court South
ITERATIVE METHODS FOR SYSTEMS OF DIFFERENTIAL EQUATIONS

In the stimulation of large systems of differential equations (and differential-algebraic equations), iterative techniques appear naturally as solutions to communication bottlenecks in parallel computing. In the context of electrical networks iterative approaches have been studied intensively under the name waveform relaxation. In this minisymposium we collect and present recent results on various aspects of the convergence, implementation and application of iteration methods for initial value problems.

Organizer: Olavi Nevanlinna
Helsinki University of Technology, Espoo, Finland

Accuracy Increase in Waveform Relaxation
Fen-Lien Juang, and C. William Gear, University of Illinois, Urbana-Champaign

Dynamic Iteration Schemes for Differential-Algebraic Equations
Benedict J. Leimkuhler, and Olavi Nevanlinna, Helsinki University of Technology, Espoo, Finland

Acceleration and Mesh Refinement in Picard-Lindelof Iteration
(To be presented by the Organizer)

Waveform Relaxation Applied to Transient Device Simulation
Mark Reichelt, Jacob White, and Jonathan Allen, Massachusetts Institute of Technology

Monday, July 17/10:30 AM
Minisymposium 5/Cabernet Room
DEVELOPMENTS AND APPLICATIONS OF NEW IDEAS IN DYNAMICAL SYSTEMS: PROGRESS IN RECENT YEARS - Part 1 of 2
(Sponsored by the SIAM Activity Group on Dynamical Systems)

Recent developments in nonlinear dynamics have brought familiar questions into new light. Subjects such as optics and signal processing are almost as old as scientific inquiry itself, but new views of each of them will be presented by Reggie Brown, Darryl Holm, and Jim Kadtke in their presentations in this minisymposium. Holm will show how developments in Hamiltonian dynamics bear on the understanding of nonlinear optics, and Brown and Kadtke will talk on aspects of signal processing in nonlinear systems with an emphasis on time series with broadband power spectra.

Organizer: Henry Abarbanel
Scripps Institution of Oceanography
University of California, San Diego

Applications of Hamiltonian Mechanics to Nonlinear Optics
Darryl D. Holm, Los Alamos National Laboratory

Prediction and Estimation Theory on Strange Attractors
Reggie Brown, University of California, San Diego

Calculating Dynamical System Invariants From Data
James D. Kadtke, University of California, San Diego

MINISYMPOSIA

Monday, July 17/10:30 AM
Minisymposium 6/Rose Room
COMBINATORIAL ALGORITHMS AND SOFTWARE DESIGN

This minisymposium focuses on combinatorial methods as used to enhance design, performance, and conceptual understanding of complex software systems.

Organizer: S. Gill Williamson
University of California, San Diego

String Differencing Algorithms with Applications to Versioning
Kiem-Phong Vo, AT&T Bell Laboratories

Mathematical Aspects of Functional Programming
Emden R. Gansner, AT&T Bell Laboratories

Graph Theory and Software Design
Hubert Halkin, University of California, San Diego

Applications of Shortest Path Algorithms to Telecommunication Networking Problems
Paul A. Kaschube, Pacific Bell; and William J. Martin, University of Waterloo, Canada

Monday, July 17/3:15 PM
Minisymposium 7/Cuyamaca Room
ITERATIVE METHODS FOR SOLVING LINEAR SYSTEMS ON PARALLEL MACHINES

The solution of systems of linear equations is one of the most frequently encountered tasks in numerical computations. Very often, such systems are large, but sparse and iterative methods such as the preconditioned conjugate gradient algorithm are used for their solution. With the event of parallel computers, there is a new challenge for the design of iterative methods since some of the most successful techniques for serial machines are, at least in part, inherently sequential and represent bottle-necks on parallel architectures. The speakers in this minisymposium will survey recent research on parallel iterative methods. Particular emphasis will be on parallel preconditioning techniques for conjugate gradient type methods.

Organizer: Roland Freund
RIACS-NASA Ames Research Center

Parallel Block Methods for Sparse Linear Systems
Howard C. Elman, University of Maryland, College Park

Parallelizing Preconditioned Conjugate Gradient Algorithms
Anne Greenbaum, Congming Li, and Han Zheng Chao, Courant Institute of Mathematical Sciences, New York University

Parallel Elliptic Preconditioners
Tony F. Chan, University of California, Los Angeles; C.-C. Jay Kuo, University of Southern California, and University of California, Los Angeles; and Charles Tong, University of California, Los Angeles

Parallel Preconditioning Techniques for General Sparse Linear Systems
Youcef Saad, RIACS-NASA Ames Research Center

Polynomial Preconditioners for Hermitian and Certain Non-Hermitian Matrices
(To be presented by the Organizer)

Monday, July 17/3:15 PM
Minisymposium 8/Laguna Room
STRUCTURED PROBLEMS IN NUMERICAL LINEAR ALGEBRA

Structure, perhaps as an extension of the notion of sparsity, is of basic importance in numerical linear algebra. Apart from obvious implications of increased computational efficiency, numerical algorithms, especially those of computing eigenvalues, should be "robust with respect to structure". This minisymposium addresses several aspects of structure. A theory of sparse matrix elimination has implications for parallel computation. The related areas of positive definite Toeplitz matrices and unitary Hessenberg matrices seem fundamental for signal processing. The quaternion eigenproblem is basic for larger classes of structured problems.

Organizer: William B. Gragg
Naval Postgraduate School

Structural Properties of Hierarchical Matrices
Daniel D. Warner, Clemson University

Doubling Algorithms for Toeplitz Systems of Linear Equations
Gregory S. Ammar, Northern Illinois University

Convergence of the QR Algorithm for Unitary Hessenberg Matrices
Tai-Lin Wang, National Chengchi University, Taipei, Taiwan

A Divide and Conquer Method for the Unitary Eigenproblem with Application to Signal Processing
Lothar Reichel, Bergen Scientific Centre, Norway

A Quaternion QR Algorithm
Angelika Bunse-Gerstner and Volker Mehrmann, Universitat Bielefeld, W. Germany; and Ralph Byers, University of Kansas, Lawrence

Monday, July 17/3:15 PM
Minisymposium 9/Mission Court South
NONLINEAR PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS

Many of the important but difficult problems from the applications are described by nonlinear parameter-dependent partial differential equations. This minisymposium deals with a small but significant selection of these problems. First, a finite element method is used for the computation of entropy solutions to the transonic full potential equation. With this approach physically correct solutions with sharp and correctly placed shocks are obtained. Next, a novel method is presented to compute two-dimensional manifolds in R^3. Specifically, capillary surfaces are determined with prescribed volume and for arbitrary physical parameters. The third talk addresses the computation of microstructure for certain crystals in cases where no minima for the bulk energy exists. Finally, Newton techniques are presented for a hierarchical finite element method applied to linear and nonlinear elliptic boundary value problems.

Organizer: Hans Mittelmann
Arizona State University

On a Finite Element-Boundary Element Method for Transonic Potential Flow Around Profiles
H. Berger, G. Warnecke, and W. Wendland, University of Stuttgart, W. Germany

The Computation of Parametrized Capillary Surfaces
(To be presented by the Organizer)

The Computation of Microstructure for Crystals
Mitchell Luskin, and Charles Collins, University of Minnesota, Minneapolis

Newton Techniques for Hierarchical Finite Element Computations
Peter Deuflhard, Konrad Zuse Center, W. Germany

Monday, July 17/3:15 PM
Minisymposium 10/Rose Room
SINGULAR PERTURBATION THEORY

Techniques associated with singular perturbation theory for differential and integral equations are proving useful in analytical and numerical studies in areas of science and technology where large gradients occur, including areas in solid and fluid dynamics, optimal control theory, transistor and semiconductor physics, population dynamics, chemical and biokinetic reactor theory, physical problems with multiple stable states, problems with internal layers and interfaces, and the numerical solution of stiff problems. The minisymposium presents recent development on computational and anlytical aspects of the subject relating to boundary value problems.

Organizer: Donald R. Smith
University of California, San Diego

On the Coupling of Boundary Element and Finite Methods for a Class of Exterior Singular Perturbation Problems
George C. Hsiao, University of Delaware

Numerical Experiments in Solving Singularly-Perturbed Boundary Value Problems
Warren E. Ferguson, Jr., Southern Methodist University

The Dirichlet Problem for a Quasilinear Singularly Perturbed Second Order System
John S. Jeffries, Rose-Hulman Institute of Technology; and Donald R. Smith, University of California, San Diego

Singularly Perturbed Dirichlet Boundary Value Problems
Stephen John Kirschvink, San Diego State University

Uniqueness and Nonuniqueness for Singularly Perturbed Boundary Value Problems
Walter Kelley, University of Oklahoma

MINISYMPOSIA

Tuesday, July 18/10:30 AM
Minisymposium 11/Champagne Ballroom
INFLUENCE OF ARCHITECTURE UPON LINEAR ALGEBRA ALGORITHMS
(Sponsorted by the SIAM Activity Group on Linear Algebra)

Architectures have a tremendous effect upon algorithms when one is interested in high performance (i.e., "squeezing out the last Mflop") from parallel and vector computers. The speakers in this minisymposium will discuss how certain classes of parallel computers influence the selection and implementation of linear algebra algorithms. Data mapping and locality, load balancing, communication complexity, vector processors and registers, cache, granularity and block vs. vector partitioning of the matrix are some of the issues that will be discussed. The classes and speakers are: The LAPACK Linear Algebra Library, James Demmel (NYU); Hypercubes, Charles Romine (ORNL); Hierarchical Memory Systems, Ahmed Sameh (CSRD, University of Illinois); and Systolic Arrays, Anthony deGroot (LLNL).

Organizer: Robert C. Ward
Oak Ridge National Laboratory

Algorithms and Performance Evaluation in the LAPACK Linear Algebra Library
James Demmel, Courant Institute of Mathematical Sciences, New York University

Linear Algebra Algorithms for Hypercubes
Charles Holland Romine, Oak Ridge National Laboratory

Linear Algebra Algorithms for Hierarchical Memory Systems
K. Gallivan, W. Jalby and Ahmed Sameh, CSRD, University of Illinois, Urbana

Linear Algebra for Systolic Arrays
Anthony J. deGroot, and Sydney R. Parker, Lawrence Livermore National Laboratory

Tuesday, July 18/10:30 AM
Minisymposium 12/Chablis Room
LARGE-SCALE OPTIMIZATION
(Sponsored by the SIAM Activity Group on Optimization)

Significant recent progress in algorithms for large-scale optimization is allowing the solution of larger and more complex models. This minisymposium consists of four talks on important topics of current research. As a set, they provide an overview of the breadth and progress of research in this area. The talks consider bound constrained quadratic programming problems that are of interest in their own right as well as for their use as subproblems in nonlinear problems; block-bordered nonlinear systems of equations that arise in many areas including VLSI design; interior point methods for convex and nonconvex quadratic knapsack problems; and parallel asynchronous SOR methods for very large linear complementarity and linear programming problems.

Organizers: Paul T. Boggs, National Institute of Standards and Technology; and Robert B. Schnabel, University of Colorado, Boulder

Algorithms for the Solution of Large-Scale Bound Constrained Quadratic Programming Problems
Jorge Moré, Argonne National Laboratory

Parallel and Sequential Methods for Solving Block-Bordered Systems of Nonlinear Equations
Robert B. Schnabel, University of Colorado, Boulder

Algorithms for the Solution of Quadratic Knapsack Problems
P. M. Pardalos, Pennsylvania State University

Parallel Solution of Very Large Linear Complemetarity Problems and Linear Programs by Asynchronous Methods
Renato De Leone, University of Wisconsin, Madison

Tuesday, July 18/10:30 AM
Minisymposium 13/Mission Court South
ALGORITHMS FOR SIMULATION OF VLSI DEVICES AND CIRCUITS

Algorithms for two-dimensional modeling of semiconductor devices based on the drift-diffusion model have matured greatly in the last decade. However, algorithms for alternative models or for three-dimensional domains are currently under development. In addition, large scale circuit simulation with limited accuracy requirements is still of interest to designers. In this minisymposium, recent progress in algorithms for device and circuit simulation will be described.

Organizer: William M. Coughran, Jr.
AT&T Bell Laboratories

Coping with Large Convective Terms in Semiconductor Device Simulation
(To be presented by the Organizer)

Jacobian Free Newton Acceleration of Algorithms for Quantum Devices
Thomas Kerkhoven, University of Illinois, Urbana

Algorithms for Three-Dimensional Device Simulation
R. K. Smith, AT&T Bell Laboratories

Operator-Based Methods for Circuit Simulation
Donald J. Rose, Duke University

Tuesday, July 18/10:30 AM
Minisymposium 14/Cabernet Room
INTERPOLATION OF TWO-DIMENSIONAL SIGNAL FROM NONUNIFORM SAMPLES

A survey of zero-crossings and nonuniform sampling of signals and systems was presented in a previous minisymposium. Here, we present various interpolation techniques developed recently for 2-D signals. The interpolation methods consist of spiral sampling, Lagrange interpolation in polar coordinates, fast FFT algorithms for nonuniform samples, etc. The applications are in imaging tomography and radar imaging.

Organizer: Farokh Marvasti
Illinois Institute of Technology

Interpolation from Samples on a Linear Spiral Scan
Eitan Yudilevich, Karmiel, Israel; and Henry Stark, Ilinois Institute of Technology

Sampling Consideration in Direct Fourier Reconstruction in Fan-Beam Tomography
Hui Peng, IBM Corporation; and Henry Stark, Illinois Institute of Technology

Lagrange Interpolation of 2-D Signals
(To be presented by the Organizer)

Nonuniform Sampling of Radiation from Antennas
Yahya Ramat Samii, Jet Propulsion Laboratory; and R. L. Cheung, California Institute of Technology

Tuesday, July 18/10:30 AM
Minisymposium 15/Rose Room
SEMIDISCRETIZATIONS OF PDEs USING ADAPTIVE METHOD OF LINES AND ITS EFFECT ON THE ODE SOLVER

Moving-grid implementation of the method of lines is an effective technique to reduce a system of partial differential equations to a large system of ordinary differential equations. Using well-developed ODE integrators then provides a reliable solution, provided the semidiscretization is done in a manner appropriate for the original PDEs. Moving, adaptive techniques on uniform grids are often used. Finite volume approximations can be used to yield high order semidiscretizations on nonuniform grids. The ODE integrator must contend with discontinuities from dynamic rezones and use appropriate measures of local truncation error for both the solution and grid. Krylov projections can be used to enhance the applicability of implicit Runge-Kutta and BDF methods to these large, sparse systems.

Organizer: Kris Stewart
San Diego State University

Combining the Method of Lines, Stiff Integrators and Krylov Methods
Alan C. Hindmarsh, Lawrence Livermore National Laboratory

Differential Algebraic Equation Formulation of the Method of Lines
Linda R. Petzold, Lawrence Livermore National Laboratory

A Moving-Grid Method for One-Dimensional PDEs Based on the Method of Lines
J. G. Verwer, Centre for Mathematics and Computer Science Amsterdam, The Netherlands

High Order Finite Volume Approximations of Differential Operators on Nonuniform Grids
James M. Hyman, Los Alamos National Laboratory

MINISYMPOSIA

Tuesday, July 18/10:30 AM
Minisymposium 16/Chenin Room
MATHEMATICAL ASPECTS OF NEURAL COMPUTING

Artificial neural networks have recently received much publicity, but they remain poorly understood. This minisymposium focuses on the mathematical properties of neural computation. The talks address both capabilities and limitations, and comparisons with other techniques for learning and classification.

Organizer: George Cybenko
University of Illinois, Urbana

Neural Networks and Their Relationship to Other Classifiers
Herbert Gish, BBN System and Technologies Corporation

Approximation Properties of Neural Networks
(To be presented by the Organizer)

Predicting Instabilities with Neural Networks
Alan Lapedes, Los Alamos National Laboratory

Complexity Issues in Learning from Random Examples
David Haussler, University of California, Santz Cruz

Tuesday July 18/3:15 PM
Minisymposium 17/Cuyamaca Room
OPTIMAL PRECONDITIONINGS

Roughly speaking, an algorithm for solving a discrete approximation to a PDE is optimal if the work required grows linearly with the number of unkowns. Multigrid algorithms that possess this property have been devised for many applications. However, there are many problems, such as indefinite elliptic PDE's and elliptic PDE's with highly discontinuous coefficients, for which effective multigrid algorithms have not yet been devised. In this case, preconditioning techniques provide an important alternative.

A preconditioned iteration that yields a prescribed error reduction in a number of steps independent of the number of unkowns must be based upon equivalent operators. The concept of spectral equivalence, applicable to self- adjoint positive definite operators, has a long history and has been an important tool in domain decomposition. The theory of norm equivalence which deals with non-self-adjoint operators is relatively new. This minisymposium will discuss the theory of equivalence and its application constructing preconditionings. Given a fixed number of unknowns, one may alternatively seek the algorithm that yields a solution in the least work. Toward this end, preconditionings that minimize the condition of the preconditioned system will also be discussed.

Organizer: Thomas A. Manteuffel
Los Alamos National Laboratory

The Theory of Equivalent Operators
(To be presented by the Organizer)

On the Theory of Equivalent Operators and Application to the Numerical Solution of Uniformly Elliptic Partial Differential Equations
Thomas A. Manteuffel, Los Alamos National Laboratory; and Seymour V. Parter, University of Wisconsin, Madison

Effective Preconditioners for Block Systems
Richard E. Ewing, University of Wyoming, Laramie

Preconditioning Techniques for Stokes Equations
James H. Bramble, Cornell University; and Joseph E. Pasciak, Brookhaven National Laboratory, Upton, NY

Optimal Preconditioners of a Given Sparsity Pattern
Anne Greenbaum, Courant Institute of Mathematical Sciences, New York University; and Garry H. Rodrigue, University of California, Davis, and Lawrence Livermore National Laboratory

Tuesday, July 18/3:15 PM
Minisymposium 18/Mission Court South
COMBINATORIAL OPTIMIZATION
(Sponsored by the SIAM Activity Group on Discrete Mathematics)

Combinatorial optimization studies optimization problems with finitely but astronomically many solutions, with the goal of developing algorithms that are substantially more efficient than the enumerative ones. It has been a very active field for the past thirty years. In the 1960's and 70's, most advances in combinatorial optimization were the result of the application of ideas from the Theories of Linear Programming and Computational Complexity. In this minisymposium we shall emphasize two of the more recent trends in the field: its applications to the design and programming of massively parallel computer systems, and the algorithmic solution of several important generalizations of classical problems in combinatorial optimization.

Organizers: T. C. Hu and C. H. Papadimitriou (Chair), University of California, San Diego

Generalized Max-Flow, Min-Cut Problems in the Plane
Daniel Bienstock, Bell Communications Research

Pebbling in Hypercubes
Fan R. K. Chung, Bell Communications Research

On Generalized Flow Problems
Andrew Goldberg, Stanford University

Folding of Regular Structures in VLSI
T. C. Hu, University of California, San Diego

Approximation Algorithms for Constrained Parallel Machine Scheduling
David Shmoys, Massachusetts Institute of Technology

Tuesday, July 18/3:15 PM
Minisymposium 19/Cabernet Room
NONLINEAR PROBLEMS IN MATHEMATICAL COMBUSTION THEORY

This minisymposium will present recent nonlinear analyses of several premixed combustion systems. The talks will describe various modes of burning in flame theory, combustion synthesis, solid and liquid propellants, and filtration combustion.

Organizers: Stephen B. Margolis (Chair), Sandia National Laboratories, Livermore, CA; Jose Vega, Universidad Politecnica de Madrid, Spain; and Bernard J. Matkowsky, Northwestern University

Downward Flame Propagation in Vertical Channels: Interaction of Steady Nonaxisymmetric Modes and Spinning Propopagation of Cellular Flames
Stephen B. Margolis, and Gregory I. Sivashinsky, Sandia National Laboratories, Livermore, CA

Birfurcation Analysis of Condensed-Phase Surface Combustion
M. Garbey, Ecole Normale, Superieure, Lyon, France; Hans G. Kaper, and Gary K. Leaf, Argonne National Laboratory; and Bernard J. Matkowsky, Northwestern University

Hydrodynamic Stability of Solid and Liquid Propellant Combustion
John K. Bechtold, and Stephen B. Margolis, Sandia National Laboratories

Modes of Burning in Filtration Combustion
M. R. Booty, Southern Methodist University; and Bernard J. Matkowsky, Northwestern University

Cellular Burner Flames
D. O. Olagunju, University of Delaware, and Bernard J. Matkowsky, Northwestern University

Global Stability of a Premixed Reaction Zone
A. Alvarez-Pereira and Jose M. Vega, Universidad Politecnica de Madrid, Spain

Tuesday, July 18/3:15 PM
Minisymposium 20/Rose Room
NUMERICAL LINEAR ALGEBRA IN CONTROL AND SIGNAL PROCESSING
(Sponsored by the SIAM Activity Group on Linear Algebra)

Existing sophisticated techniques of numerical algebra have played a significant role in recent years in the development of numerically effective procedures for mathematical problems in control and signal processing. Numerical methods in these areas are, however, still in infancy and are lagging behind in respect to other applied areas.

The speakers in this session will discuss some of the "state-of-the-art" techniques of numerical linear algebra and show how they can be gainfully employed to numerically solve several important mathematical problems in control and signal processing.

Organizer: Biswa Nath Datta
Northern Illinois University

Modified Least Squares Computations
Robert J. Plemmons, North Carolina State University

Numerical Considerations in Model Based Spectrum Estimation
Bhaskar D. Rao, University of California, San Diego

Rational Modeling of Random Fields by Singular Value Decomposition
K. S. Arun and J. V. Krogmeier, University of Illinois, Urbana

A Faster and Stable Downdating Algorithm
Ching-Tsuan Pan, Northern Illinois University

An Application of Variational Methods and Nonlinear Least Squares in Image Processing
Bruce Barnes and Shankar Chatterjee, University of California, San Diego

MINISYMPOSIA

Wednesday, July 19/3:15 PM
Minisymposium 21/Champagne Ballroom
MODELING THE EPIDEMIOLOGY OF AIDS

The impact of AIDS on the people and the health care systems in the United States and in the world is enormous and will increase in the future. Although mathematical models and methods have been used for sexually-transmitted and other diseases, AIDS is somewhat different so that new models must be developed. Some parameters in these new models characterize inter-and intra-risk group mixing, partner relationships and duration, and infectivity in the stages between HIV infection and AIDS. The presentations cover the formulations, analyses and applications of dynamic models of HIV transmission and the development of AIDS.

Organizer: Herbert W. Hethcote, University of Iowa

A Dynamic Model of HIV Transmission and AIDS in San Francisco
(To be presented by the Organizer)

Effects of Contact Patterns on HIV Transmission
Carl P. Simon, The University of Michigan, Ann Arbor

Using Mathematical Models to Understand the AIDS Epidemic
Elizabeth Ann Stanley, James M. Hyman, and Stirling Auchincloss Colgate, Los Alamos National Laboratory; and Steven Thomas Seitz, University of Illinois, Champaign

Theories of Aggregation and Mixing for Models of HIV Transmission
Carlos Castillo-Chavez, Cornell University

Wednesday, July 19/3:15 PM
Minisymposium 22/Chablis Room
LINEAR ALGEBRA IN CONTROL AND SYSTEMS THEORY – Part 1 of 2
(Sponsored by the SIAM Activity Group on Control and Systems Theory)

Linear algebra is playing a fundamental role in the advances being made in systems and control applications. While linear algebra has contributed to theoretical advances in these areas the most impact has been in the computational and implementational aspects where numerical linear algebraic algorithms have revolutionalized the ways in which many problems are solved. A considerable number of novel techniques have been obtained which are both elegant and powerful. But many problems are still waiting for an adequate algorithm that is both fast and accurate and at the same time respects the structure of the problem.

Organizers: Alan J. Laub, University of California, Santa Barbara; and Paul Van Dooren (Chair), Philips Research Laboratory, Brussels, Belgium

Transmission Zeros and Decentralized Output Feedback
R. B. Patel, Concordia University

Computational Aspects of H^∞ Control
D. J. N. Limebeer, Imperial College of Science and Technology, United Kingdom

Estimating Distance to Uncontrollability Upper and Lower Bounds
Daniel Boley, University of Minnesota, Minneapolis, MN

Computing the Transmission Zeros of a Generalized State Space System
Paul Van Dooren, Philips Research Laboratory, Brussels, Belgium

(G)SVD Updating for Tracking Slowly Time-Varying Systems
Marc Moonen, ESAT Katholieke Universiteit Leuven, Belgium; Paul Van Dooren, Philips research Laboratory, Brussels, Belgium; and Joos Vanderwalle, ESAT Katholieke Universiteit Leuven, Belgium

Wednesday July 19/3:15 PM
Minisymposium 23/Cuyamaca Room
MULTILEVEL ADAPTIVE METHODS

Multilevel adaptive methods is a general term for multigrid-like methods that apply to adaptive solution of partial differential equations. This minisymposium will present several new developments in this field with special emphasis on advanced computation. Topics include parallel computation, computational fluid dynamics, and preconditioners.

Organizer: Steve McCormick
University of Colorado, Denver

Multilevel Adaptive Methods in Parallel Computation
(To be presented by the Organizer)

Adaptively Solving the Stokes Equations
Randolph E. Bank, Bruno D. Welfert, University of California, San Diego; and Harry Yserentant, Universitat Dortmund, W. Germany

Adaptive Preconditioning for High Aspect Ratio Subdomains
Alan Craig, and Jan Mandel, University of Colorado, Denver

Parallel Adaptive Methods
Marsha Berger, Courant Institute of Mathematical Sciences, New York University

Multigrid Solution of 3D Anisotropic Elliptic Equations on Local Memory Parallel Computers
Ute Gartel, German National Research Center for Computer Science, W. Germany

Wednesday, July 19/3:15 PM
Minisymposium 24/Cabernet Room
RECENT DEVELOPMENTS IN NUMERICAL METHODS FOR DISCONTINUOUS SOLUTIONS TO HYPERBOLIC PROBLEMS

In recent years, there have been many developments in the analysis and design of efficient algorithms for approximating singulr solutions of nonlinear partial differential equations, and for hyperbolic problems in particular. We mention the TVD and ENO approaches for numerical shock capturing (Osher, Chakravarthy, Engquist, Harten), and several recent algorithms for front propagation (Osher and Sethian). For complex physical problems arising in magnetohydrodynamics, elasticity and combustion the structure of the solution depends on the additional scales inherent in the problem such as viscosity and reaction rate. It represents a big challenge for both analysts and scientific computation specialists. In this minisymposium we propose to have several specialists in these diverse areas present state-of-the-art techniques in analysis and algorithm design.

Organizers: Edward Harabetian, University of Michigan, Ann Arbor; and M. Brio, University of Arizona, Tucson

Numerical Front Capturing
S. Osher, University of California, Los Angeles

A Flow Solver Based on UNO
S. Chakravarthy, Rockwell Science Center, Thousand Oaks, CA

Convergence of the Point Vortex Method for the Incompressible Euler Equations
Jonathan Goodman, Thomas Y. Hou, and John Lowengrub, Courant Institute of Mathenmatical Sciences, New York University

Shock Waves and the Riemann Problem in MHD and Combustion
(To be presented by the Organizers)

Wednesday, July 19/3:15 PM
Minisymposium 25/Rose Room
COMPLEXITY OF DATA STRUCTURES

Data structures are basic to many areas of computer science, including algorithm design, data bases, and artificial intelligence. For application to algorithm design, the issue of efficiency is of primary interest. In recent years, increasingly sophisticated methods (drawing from geometry, probability theory, and discrete mathematics) have been applied for the purposes of analyzing particular data structures as well as determining the complexity of data structure problems. This minisymposium will include talks illustrating these recent developments.

Organizer: Michael L. Fredman
Bell Communications Research

More Analysis of Double Hashing
George S. Luecker and Mariko Molodowitch, University of California, Irvine

Universal Functions for Double Hashing
Alan Siegel, Stanford University, and New York University

Implicit O(1) Probe Search
Amos Fiat, Tel Aviv University; and Moni Naor, IBM Almaden Research Center

Applications of Fast Matrix Searching
Maria Klawe, University of British Columbia

Computer Analysis of the Game of Sprouts
David Applegate, Guy Jacobson, and Daniel Sleator, Carnegie-Mellon University

MINISYMPOSIA

Thursday, July 20/10:30 AM
Minisymposium 26/Champagne Room
APPLICATIONS OF PARALLEL COMPUTERS TO PROBLEMS IN COMPUTATIONAL FLUID DYNAMICS

Detailed analysis of many problems of interest in CFD taxes even the most powerful of today's serial supercomputers. Interest has therefore begun to turn towards large scale parallel computers that promise improved performance and economy by several orders of magnitude. Work on large scale parallel computers is underway in a number of areas. First, the effective utilization of the computer and memory resources of the system; second, the minimization of the overhead incurred in communication between individual processors, and finally, the search for effective algorithms that can be efficiently decomposed across the processor mesh. The speakers in this minisymposium will examine these techniques with specific examples taken from the field of Computational Fluid Dynamics.

Organizer: Ian A. Taylor
Intel Scientific Computers

Computational Methods in Aerodynamics
(To be presented by the Organizer)

Fluids Codes in Distributed Memory: Techniques Tools and Examples
Geoff Chesshire, Intel Scientific Computers

Object-Oriented Formulations for Computational Fluid Dynamics
William T. Thompkins, Jr., and Ian Angus, Northrop Research and Technology Center

The Euler Equations: Parallel Approaches
Herman J. Migliore, Portland State University

Thursday, July 20/10:30 AM
Minisymposium 27/Chablis Room
SIGNAL PROCESSING ALGORITHMS

Signal processing is a rich source of mathematical problems. This minisymposium will highlight linear algebra problems arising in signal parameter estimation. Areas of interest include conceptual solutions, numerical methods, and parallel computation techniques for real-time implementations.

A second theme of this minisymposium is the applications of functional equations in signal processing. Functional equations occur in the characterization of decompositions for the representation of both signals and transforms for linear and multilinear signal processing.

Organizer: Jeffrey M. Speiser
Naval Ocean Systems Center, San Diego

Signal Processing Applications of Constrained Total Least Squares with Multiple Homogeneous Constraints
Michael D. Zoltowski, Purdue University, West Lafayette, IN

Least Squares Error Modeling via Parametric Signal Vectors
James A. Cadzow, Vanderbilt University

Generalized Canonical Correlations and Their Computations
L. M. Ewerbring, and Franklin T. Luk, Cornell University

Functional Equations in Signal Processing
(To be presented by the Organizer)

Thursday, July 20/10:30 AM
Minisymposium 28/Cuyamaca Room
NUMERICAL LINEAR ALGEBRA IN SYSTEMS AND CONTROL THEORY (Part 2 of 2)
(Sponsored by the SIAM Activity Group on Control and Systems Theory)

Numerical linear algebra continues to enjoy a most fruitful symbiotic relationship with systems and control theory. Problems in the latter have been instrumental in suggesting important new research directions. Conversely, numerical linear algebra considerations are absolutely essential in addressing many of the challenging computational problems facing systems and control theory designers today. This minisymposium, divided into parts I and II, consists of state-of-the-art papers in which this exciting cross-disciplinary interplay will be featured prominently.

Organizers: Alan J. Laub, University of California, Santa Barbara; and Paul Van Dooren, Philips Research Laboratory, Brussels, Belgium

Toeplitz Inversion Formulas and Cyclic Displacement
Greg Ammar, Northern Illinois University; and Paul Gader, ERIM, Ann Arbor, Michigan

Robust Pole Assignment Rescued
Ralph Byers, University of Kansas, Lawrence

A State Space Theory of Structured Uncertainty
Gary A. Hewer, Naval Weapons Center, China Lake, CA

Condition Estimates for the Matrix Sign Function and Polar Decomposition
Charles Kenney, and Alan J. Laub, University of California, Santa Barbara

Thursday, July 20/10:30 AM
Minisymposium 29/Laguna Room
DEVELOPMENTS AND APPLICATION OF NEW IDEAS IN DYNAMICAL SYSTEMS; PROGRESS IN RECENT YEARS - Part 2 of 2
(Sponsored by the SIAM Activity Group on Dynamical Systems)

Dynamical systems are important both as an exciting fundamental discipline and in terms of their applications to a wide variety of other fields. Speakers will describe recent progress in chaotic dynamics, stochastic dynamical systems, numerical computation of dynamical systems of partial differential equations, and quantum chaotic dynamical systems.

Organizers: Celso Grebogi, University of Maryland, College Park; and Bernard J. Matkowsky, Northwestern University

Sudden Changes in Chaos
Edward Ott, University of Maryland, College Park

Periodic Orbits in Chaotic Wavefunctions
Robert G. Littlejohn, University of California, Berkeley

Recent Progress in Stochastic Dynamics
Zeev Schuss, Tel Aviv University, Israel

Computation of Dynamical Systems of Partial Differential Equations
Alvin Bayliss, Northwestern University

Thursday, July 20/10:30 AM
Minisymposium 30/Cabernet Room
SCIENTIFIC PROGRAMMING ENVIRONMENTS

Just as hardware has improved dramatically in the last decade, so have software tools become more rewarding since the days of Fortran and printer plots. Four areas of progress are featured: languages, iconic user interfaces, symbolic algebra, and visualization.

Organizers: William M. Coughran, Jr., and Eric Grosse, AT&T Bell Laboratories

C Language and Numerical Programming
Tom MacDonald, Cray Research, Inc.

The Apple Macintosh™ as a Scientific Workstation
Henry S. Greenside, Duke University

The Symbolic Algebra System Maple
Gaston Gonnet, University of Waterloo, Canada

Scientific Visualization
Eric Grosse, AT&T Bell Laboratories

Thursday, July 20/3:45 PM
Minisymposium 31/Champagne Room
LINEAR ALGEBRA FOR MASSIVELY PARALLEL PROCESSORS

Linear algebra problems are important in scientific computing and it is therefore of interest to access the performance of modern computers on these problems. This minisymposium will focus upon massively parallel processors. The speakers will discuss the performance of algorithms and kernels from Linear Algebra on various massively parallel machines. Some emphasis will be given to the performance of these kernels in applications. There will be four talks concerning experience on three existing massively parallel computers: the Connection Machine, AMT-DAP, and NCUBE.

Organizer: Danny C. Sorensen
Argonne National Laboratory

LU Decomposition on the Connection Machine
John Gilbert, Xerox Palo Alto Research Center; and Robert S. Schreiber, RIACS-NASA Ames Research Center

Linear Algebra on MIMD Parallel Processors
Gary R. Montry, Sandia National Laboratories

Linear Algebra Kernels for SIMD Architectures
Brian T. Smith, University of New Mexico, Albuquerque

A Linear Algebra Library for the Connection Machine
Lennart S. Johnsson, Thinking Machines Corporation

MINISYMPOSIA

Thursday, July 20/3:45 PM
Minisymposium 32/Laguna Room
CONTROL AND MODELING OF NONLINEAR SYSTEMS

This minisymposium brings together speakers from diverse fields of nonlinear control systems. Talks will range from theoretical advances to mixtures of theory with industrial models.

Organizer: J. William Helton
University of California, San Diego

(Title to be announced)
Arthur J. Krener, University of California, Davis

(Title to be announced)
M. Morari, California Institute of Technology

Toward a Nonlinear H Infinity Control
(To be presented by the Organizer)

Thursday, July 20/3:45 PM
Minisymposium 33/Mission Court South
PHARMACOKINETICS
(Sponsored by the SIAM Activity Group on Linear Algebra)

This minisymposium will highlight current efforts to improve drug therapy through the use of pharmacokinetic models of drug disposition in the human body. Pharmacokinetic analysis is used for therapeutic dose management, drug development and research on drug/disease interactions. New technologies for data acquisition and drug development demand (and make possible) the use of more sophisticated mathematical models and analyses. Specific issues to be addressed include computing environments, analysis of data from animal studies, control strategies for clinical applications, and neurotransmitter/receptor studies using tomographic data.

Organizer: Pamela G. Coxson
Lawrence Berkeley Laboratory

Pharmacokinetic Models in Drug Development
Patrick D. McCray, Searle Research and Development, Skokie, IL

The Use of Interspecies Scaling Techniques in Drug Development
Joyce Mordenti, Genentech, South San Francisco, CA

Control Strategies for Phamacokinetic Systems
Alan Schumitzky, University of Southern California

Pharmacokinetic Models Using Tomographic Data
(To be presented by the Organizer)

Thursday, July 20/3:45 PM
Minisymposium 34/Cabernet Room
PERTURBATION METHODS FOR STRONGLY NONLINEAR OSCILLATORS

The method of multiple scales or averaging is used to analyze strongly nonlinear oscillators with slowly varying parameters and small perturbations. In this minisymposium, some recent advances and applications will be described. Higher order terms than those usually calculated will be shown necessary to determine the leading order solution: very slowly varying Hamiltonian systems and the phase shift for nonlinear oscillators. Problems will be presented in which multiple scales or averaging fails, requiring the method of matched asymptotic expansions: sustained resonance, slow passage through a separatrix, and the transitions associated with a model of bursting electrical activity.

Organizer: Richard Haberman
Southern Methodist University

Slowly- Varying Strongly Nonlinear Oscillators and Dispersive Waves (with Perturbations)
F. Jay Bourland and Richard Haberman, Southern Methodist University

Sustained Resonance in Very Slowly Varying Hamiltonian Systems
D. L. Bosley and J. Kevorkian, University of Washington, Seattle

Connection Across a Separatrix with Dissipation
F. Jay Bourland and Richard Haberman, Southern Methodist University

A Perturbation Problem for a Model of Bursting Electrical Activity in Pancreatic Beta-Cells
Mark Pernarowski, University of Washington, Seattle; and Robert M. Miura, University of British Columbia

Thursday, July 20/3:45 PM
Minisymposium 35/Rose Room
MATHEMATICAL CONTEST IN MODELING (MCM)—MODELING AT THE UNDERGRADUATE LEVEL

There will be a brief (ten-minute) introduction to the Mathematical Contest in Modeling (MCM), followed by a presentation by the SIAM-designated winning team(s). This will be followed by presentations by authors of undergraduate texts in applied mathematics. The program will be of interest to anyone who is interesed in seeing the output from a week-end contribution of three undergraduates or is interested in introducing an undergraduate course in modeling.

Organizer: Ben Fusaro
Salisbury State University

Introduction to MCM
(To be presented by the Organizer)

(Title to be announced)
Gilbert Strang, Massachusetts Institute of Technology

(Additional titles and speakers to be announced)

Friday, July 21/10:30 AM
Minisymposium 36/Champagne Room
APPLICATIONS OF FRONT TRACKING

There are many problems in physics whose solution contains discontinuities. The evolution of these discontinuities is often the most interesting aspect of the solution and the hardest to determine. The front tracking method treats discontinuities as significant degrees of freedom and is ideally suited to the solution of such problems. Recent progress has overcome most of the complexity issues that have limited the use of front tracking in the past, and has led to exciting developments in the theory of nonlinear hyperbolic and parabolic equations. The goal of the minisymposium is to present a sample of the problems that can be handled by front tracking. The examples are drawn from gas dynamics, oil reservoir modeling, flame propagation and unstable solidification.

Organizers: Alexandre J. Chorin, University of California, Berkeley; and James G. Glimm, Courant Institute of Mathematical Sciences, New York University

Front Tracking, Oil Reservoirs, and Engineering Scale Problems
James Glimm, W. Brent Lindquist, and Qiang Zhang, Courant Institute of Mathematical Sciences, New York University

The Production of Anomalous Waves in Shock-Fluid Interface Interactions
John W. Grove, State University of New York, Stony Brook

Efficient Numerical Methods for Propagating Surfaces: Hamilton-Jacobi Equations and Hyperbolic Conservation Laws
James A. Sethian, University of California, Berkeley

Unstable Solidification Fronts
John Strain, Courant Institute of Mathematical Sciences, New York University

Friday, July 21/10:30 AM
Minisymposium 37/Cuyamaca Room
CONDITIONAL EVENT ALGEBRAS AND CONDITIONAL PROBABILITY COMPUTATIONS

Standard approaches to conditional probability lack the ability to address the CEEDA (Combination and Evaluation of Events having Different Antecedents) problem such as determining p(((a | b)v(c | d))'.(e | f)). Current and past treatment of this issue include: 1, identification of conditioning with implication in logic; 2, construction of common joint antecedents; 3, use of analogues with ordinary fractions; 4, development of conditional event (CE) algebras. Except for approach 4, the above procedures are either unsound or too restrictive in application. This presentation will show that: CE algebras can be determined as natural extensions of boolean algebras; are compatible with all conditional probability evaluations; lead to a feasible solution of the CEEDA problem; and have a wide variety of applications and properties.

Organizer: I. R. Goodman
Naval Ocean Systems Center

History and Background of Combining Conditional Events with Differing Antecedents
(To be presented by the Organizer)

A Conditional Event Algebra Based on Functional Images with Applications
N. T. Nguyen, New Mexico State University

An Emperically-Based Conditional-Event Algebra with Application to Expert Systems
Philip Calabrese, LOGICON, San Diego, CA

Development of Conditional Event Algebras for Non-Probabilistic Settings and Computational Complexity
David W. Stein, Naval Ocean Systems Center

MINISYMPOSIA

Friday, July 21/10:30 AM
Minisymposium 38/Mission Court South
DISCRETE MATHEMATICAL STRUCTURES IN RELIABILITY
(Sponsored by the SIAM Activity Group on Discrete Mathematics)

Reliability problems frequently arise in the analysis and design of communication, engineering and transportation systems. One is typically interested in studying how the structure and reliability characteristics of the components of such a system affect the overall performance of the system. A number of discrete structures (e.g., matroids, lattices, ordered sets) have recently been identified that aid in analyzing the performance of general coherent systems. In the case of network reliability problems, properties of the underlying graph can be exploited to produce improved solution algorithms. This series of talks will explore various discrete structures and their relation to reliability problems. The inherent complexity of reliability problems, and solvable special cases, will be a common theme of the talks. Both exact and approximate methods for calculating reliability will be presented.

Organizer: Douglas R. Shier
College of William and Mary

An Overview of Network Reliability Problems
(To be presented by the Organizer)

An Algebraic Unification of Reliability Computation
J. Scott Provan, University of North Carolina, Chapel Hill

Series-Parallel Bounds for Two-terminal Reliability
Charles J. Colbourn, University of Waterloo, Canada

Some Recent Results on Δ-Y-Δ Graphs
A. Satyanarayana,
Stevens Institute of Technology

Friday, July 21/10:30 AM
Minisymposium 39/Cabernet Room
EXACTLY SOLVABLE NONLINEAR EVOLUTION EQUATIONS

The discovery that a class of nonlinear evolution equations may be solved by the Inverse Scattering Transform has had broad implications in mathematics and physics. This minisymposium deals with related problems of current interest. These include solutions via novel series methods, asymptotic analysis, solutions to periodic boundary value problems, and "weakly" nonintegrable equations. Applied mathematicians with a desire to learn about some of the exciting directions and open questions related to exactly solvable nonlinear systems will want to attend.

Organizer: Mark J. Ablowitz
Clarkson University

Painleve Expansions for Integrable and Nonintegrable Evolution Equations
Michael Tabor, Columbia University

Fully Nonlinear Mode Truncations for Nearly Integrable Partial Differential Equations
M. Gregory Forest, The Ohio State University, Columbus

A Brief Survey of Recent Progress in Periodic Nonlinear Schrodinger Theory
E. R. Tracy, College of William and Mary

Higher Order Lax-Levermore Theory
Stephanos Venakides, Duke University

Friday, July 21/10:30 AM
Minisymposium 40/Rose Room
GRAPHS AS MEASURES OF NETWORK VULNERABILITY
(Sponsored by the SIAM Activity Group on Discrete Mathematics)

During the last few years graphs have become increasingly more important in the study of networks. They are particularly valuable when used as deterministic models wherein their graph theoretic properties are examined in order to magnify vulnerability and path structures. This minisymposium looks at four different research efforts in graph theory which seem to have high potential for applications to network vulnerability.

Organizer: Richard D. Ringeisen
Clemson University

Uniformly Reliable and Unreliable Graphs Charles Suffel, Stevens Institute of Technology

Uniformly Optimal Graphs for Pair-Connected Reliability Measures
Peter J. Slater, University of Alabama, Huntsville

On the Vulnerability of Cycle Permutation Graphs
Barry Piazza, University of Southern Mississippi; Richard Ringeisen, Clemson University; and Sam Stueckle, University of Idaho

Graphs and the Channel Assignment Problem
J. Richard Lundgren, University of Colorado, Denver

Friday, July 21/2:00 PM
Minisymposium 41/Cuyamaca Room
DOMAIN DECOMPOSITION AND APPLICATIONS
(Sponsored by the SIAM Activity Group on Supercomputing)

The domain decomposition approach on solving numerically elliptic partial differential equations is a rapidly growing area of active research. It is a very natural approach, especially if the physical domain is partitioned into subdomains in which the problems can be solved in a simpler manner. Often such subproblems easily lend themselves to parallel processing. This minisymposium puts special emphasis on real life applications of the method of domain decomposition.

Organizer: Wlodek Proskurowski
University of Southern California

Application of Domain Decomposition Techniques for Efficient Adaptive Local Grid Refinement
Richard E. Ewing, University of Wyoming, Laramie

Parallel Solution of Coupled Transport Equations Through Domain Decomposition
David E. Keyes, and Mitchell D. Smooke, Yale University

A Robust Parallel Solver for Non-Selfadjoint Elliptic Partial Differential Equations
Randall Bramley and Ahmed Sameh, CSRD, University of Illinois, Urbana

Application of Domain Decomposition to the p-Version Finite Element Method in Three Dimensions
Jan Mandel, University of Colorado, Denver

Multilevel Adaptive Methods in Computational Fluid Dynamics
Steve McCormick, University of Colorado, Denver

On Domain Decomposition and Cellular Automata Particle Methods for Solving Burger's Equation
Bracy H. Elton, and Garry Rodrigue, Lawrence Livermore National Laboratory

Friday, July 21/2:00 PM
Minisymposium 42/Laguna Room
NONCONFORMING AND NON-NESTED MULTIGRID METHODS

Recently there has been much research done extending multigrid methods to include applications in which the approximating spaces are not nested. This arises for either finite difference or finite element methods when the meshes used are not nested. For finite element and spectral methods this can also arise when the meshes are nested by the approximating functions are nonconforming (for the spectral method, due either to a nonconforming decomposition of the domain or to the use of polynomials of different degrees on each subdomain). The objective of the minisymposium is to examine the way in which different theoretical approaches to the subject can complement each other and to assess the need for future research in the area.

Organizer: Ridgway Scott
Pennsylvania State University

A General Analysis of Multigrid Algorithms With Non-nested Spaces or Noninherited Forms
James H. Bramble, Cornell University; Joseph E. Pasciak, Brookhaven National Laboratory, Upton, NY; and Jinchao Xu, Pennsylvania State University

Nonconforming Multigrid Methods
Susanne Brenner, Syracuse University

Multigrid Methods for Macro-Finite-Elements
Shangyou Zhang, Purdue University, West Lafayette, IN

Multigrid Algorithms for Elliptic Problems on Curved-boundary Domains
James H. Bramble, Cornell University, Joseph E. Pasciak, Brookhaven National Laboratory, Upton, NY; and Jinchao Xu, Pennsylvania State University

The Mortar Element Method: A New Nonconforming Approach
Y. Maday, Massachusetts Institute of Technology

MINISYMPOSIA

Friday, July 21/2:00 PM
Minisymposium 43/Mission Court South
PROBLEMS FROM INDUSTRY BROUGHT TO MATH CLINICS

Math Clinics are operating at various centers, involving students in the solution of "real-world" problems arising in industry. The talks included here describe present and past projects, and indicate some open problems waiting for future attention.

Organizer: Ellis Cumberbatch, The Claremont Graduate School

MOSFET Modelling
(To be presented by the Organizer)

Parameter Extraction from Nonlinear Equations Found in Integrated Circuits (IC) Engineering
Martin Buehler, Jet Propulsion Laboratory

Statistical Expert Systems (IBM)
Hedley Morris, San Jose State University

Testing and Study of 2-D k-Space Codes (Lockheed)
Hedley Morris, San Jose State University

A Data Interface in Simulation
G. R. Chapman, University of Guelph, Canada

Coordinate Transformation in Quality Assessment
G. R. Chapman, University of Guelph, Canada

Flutter, Squeeze, and Melt-Down
Courtney Coleman, Harvey Mudd College

Neural Networks Image Classifier
Mario Martelli, California State University, Fullerton

Physical and Mathematical Simulations in Clinic Projects
Bruno Forte, University of Waterloo, Canada

Flooding and Flow Reversal in Annular Two-Phase Flows, A. C. Fowler, Oxford University; and P. E. Seward, C.E.G.B., United Kingdom

Friday, July 21/2:00 PM
Minisymposium 44/Cabernet Room
MATRICES AND OPTIMIZATION
(Sponsored by the SIAM Activity Group on Linear Algebra)

Matrices interact with optimization in several ways. Techniques from optimization can be used in algorithms in numerical and core linear algebra. Theorems from optimization can be used in matrix proofs. Matrices are one appropriate framework in which to develop a variety of other subjects, including subjects in optimization. And both matrices and optimization can be employed in the solution of problems arising outside either area. This minisymposium will present a sampling of these interactions.

Organizers: David Carlson, San Diego State University; and Henry Wolkowicz, University of Waterloo, Canada

Condition Numbers and Optimization
William W. Hager, University of Florida, Gainesville

Schur Complements, Operator Means, and Linear Programming
W. N. Anderson, Fairleigh Dickinson University; T. D. Morley, Georgia Institute of Technology; and G. E. Trapp, West Virginia University

P-Matrices and the Linear Complementarity Problem: Recent Results
Jong-Shi Pang, The Johns Hopkins University

The Quadratic Assignment Problem
S. Hadley, Henry Wolkowicz, University of Waterloo, Canada; and F. Rendl, Technische Universitat Graz, Austria

Matrix Scaling, Entropy Minimization, and Conjugate Duality
Michael H. Schneider, The Johns Hopkins University

Friday, July 21/2:00 PM
Minisymposium 45/Chenin Room
NUMERICAL METHODS IN PLASMA PHYSICS

The object of this session is to provide an introduction for numerical analysts to the problems of plasma physics. The design of present day tokamaks, prototype nuclear fusion reactors, depends heavily upon numerical computations. These computations, usually done on CRAY computers, attempt to model the physics of tokamaks. The correctness of the physics, the model, and the numerics can only be determined by comparison with experimental data taken from earlier tokamaks. Often the problems which arise are beyond published numerical literature. In this session we will present a selection of our most important numerical problems, the numerics we have used, and the context of the problem.

Organizer: F. Joanne Helton
General Atomics, San Diego, CA

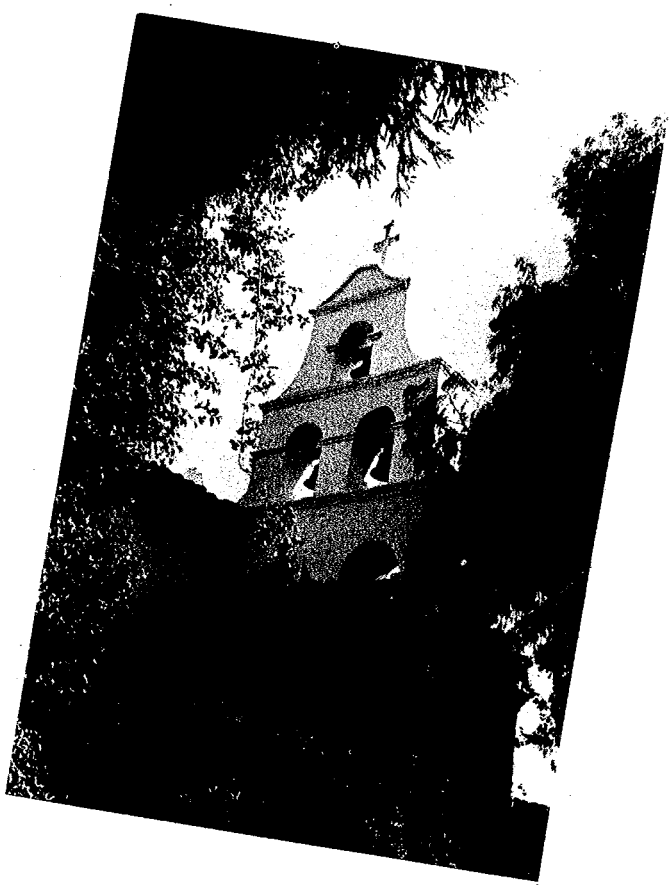
Problems With Transport Models Whose Coefficients Are Strongly Dependent Upon Gradients
Ronald E. Waltz, General Atomics, San Diego, CA

Accurate Calculation of Vacuum Contributions to Ideal MHD Stability in Tokamak Plasmas
Alan D. Turnbull, General Atomics, San Diego, CA

A Nonlinear Boundary Layer Problem in Plasma Transport Theory
Fred L. Hinton, General Atomics, San Diego, CA

Convergence Problems When Inverting a Two Dimensional Laplace-like Operator in Flux Coordinates
Robert L. Miller, General Atomics, San Diego, CA

Determination of Plasma Density and Rotation Speed by Least Squares Fitting of Nonlinear Models to Spectra Containing Multiple Spectral Lines
Keith H. Burrell and Richard J. Groebner, General Atomics, San Diego, CA



CONTRIBUTED PRESENTATIONS

Monday, July 17/10:30 AM
Contributed Presentations 1/Laguna
PRECONDITIONING AND CONJUGATE GRADIENTS

Iterative Solution of Finite Element Equations on Irregular Grids
Alison Ramage, University of Bristol, United Kingdom

Optimal Tchebychev Ellipse for the Eigensolution of Large Scale Nonsymmetric Matrices
Diem Ho, IBM Scientific Center, Paris, France

Polynomial Acceleration Methods for Solving Singular Linear Equations
Zhi-hao Cao, Fundan University, Shanghai, China

On the Basis Reduction Method
J.P. Milaszewicz, Ciudad Universitaria, Buenos Aires, Argentina

A Lanczos Procedure for Solving Nonsymmetric Systems of Equations
Jane Cullum and Ralph Willoughby, IBM T.J. Watson Research Center

Globally Convergent Nonlinear Krylov Subspace Methods
Peter Brown, Lawrence Livermore National Laboratory; and Youcef Saad, RIACS NASA Ames Research Center

Parallel Preconditioning with Approximate Inverses
Horst D. Simon, NASA Ames Research Center and Boeing Computer Services, Seattle

Adaptive Polynomial Preconditioning for HPD Matrices
Steven F. Ashby, Lawrence Livermore National Laboratory; and Thomas A. Manteuffel, Los Alamos National Laboratory and University of Colorado, Denver

Monday, July 17/10:30 AM
Contributed Presentations 2/Chenin
COMPUTER SCIENCE I

An Optimal String Searching Algorithm
Russell W. Quong, Purdue University

Decoding Spherical Codes for the Gaussian Channel
John K. Karlof, University of North Carolina, Wilmington

Computed Similarity
Rauf Taha, May & Speh, Inc., Downers Grove, IL

On Fast Separability Conditions in Pattern Recognition
John Najarian, William Paterson College

Nearest Neighbor Cellular Automata
Burton Voorhees, Athabasca University, Canada

Design Approaches for Robot Languages
Adel S. Elmaghraby and Dar-jen Chang, University of Louisville

Ratio Estimators Are Maximum Likelihood Estimators for Non-Context- Free Grammars
Keith Humenik, University of Maryland, Baltimore County

Transposition Errors in Context-Free Languages
Keith Humenik, University of Maryland, Baltimore County; and Roger S. Pinkman, Stevens Institute of Technology, Hoboken, NJ

Monday, July 17/3:15 PM
Contributed Presentations 3/Champagne Ballroom
PARALLEL NUMERICAL LINEAR ALGEBRA I

A General Parallel Algorithm for the Symmetric Tridiagonal Eigenvalue Problem
Yue Zhang and Avi Lin, Temple University

Practical Experiences with a Parallel Symmetric Eigensystem Algorithm
Dan Kalman and Robert Lindell, The Aerospace Corporation, Los Angeles, CA

A Parallel Norm-reducing Algorithm for the Non-symmetric Eigenvalue Problem
Gautam Shroff, Rensselaer Polytechnic Institute; and Robert Schreiber, RIACS NASA Ames Research Center

New Approach to Symmetric Eigenvalue Computation
Victor Pan, CUNY-Lehman College, and SUNY, Albany

A Novel Bit-level Algorithm for the Symmetric Eigenvalue Problem
Franklin T. Luk and David E. Schimmel, Cornell University

A Parallel Algorithm for Computing the Tridiagonalization of a Symmetric Matrix
Bruce W. Suter and Scott R. Joines, University of Alabama, Birmingham

A Parallel Algorithm for the Solution of Seven-Banded Block Tridiagonal Linear Systems
John A. Turner, North Carolina State University

A Constrained Least Squares Problem
Gene H. Golub, Stanford University; and Urs von Matt, Institut fur Wissenshaftliches Rechnen ETH Zentrum, Switzerland

On Some Computations with Dense Structured Matrices
Victor Pan, CUNY-Lehman College, and SUNY, Albany

An Improved Newton's Iteration for the Generalized Inverse of a Matrix, with Applications
Victor Pan, CUNY-Lehman College, and SUNY, Albany; and Robert Schreiber, Research Institute for Advanced Computer Science, Mountain View, CA

New Effective Methods for Computations with Dense Structured Matrices
Victor Pan, CUNY-Lehman College, and SUNY, Albany

Monday, July 17/3:15 PM
Contributed Presentations 4/Chablis
FLUID MECHANICS

Thermal Convection in the Earth's Mantle Some Bifurcations and Trajectories
Cheryl A. Stewart, Cornell University

An Asymptotic Analysis of the Ozone Decomposition Flame
Richard Y. Tam, Indiana University-Purdue University, Indianapolis

How Fast do Lines and Surfaces Grow in Random Velocity Fields?
Ian T. Drummond and Wolfram H.P. Munch, University of Cambridge, United Kingdom

Drag Force for an Annular Disk Approaching a Plane Wall
Anthony M.J. Davis, University of Alabama, Tuscaloosa

PDF Analysis of Molecular Mixing in Turbulent Flows
Roger H. Rangel and William A. Sirignano, University of California, Irvine

Convected Instabilities
Ellis Cumberbatch, Claremont Graduate School

A Reaction-Diffusion Model for a Contamination Problem
Meir Shillor, Oakland University

A Fixed Grid for Vortex Methods
Dalia Fishelov, The Weizmann Institute of Science, Israel

A Non-Linear Heat Transfer Problem with Natural Convection and Moving Boundaries
Stephen B. Wineberg, KMS Fusion, Inc., Ann Arbor

Improving the Rates of Convergence of Iterative Methods in CFD by Shifting the Spectrum of Implicit Operators
Angela Cheer, University of California, Davis; and Mohammad Saleem, University of Missouri, St Louis

Pressure Estimation in Immersed Boundary Problems
Sherwood Samn, USAF School of Aerospace Medicine

Monday, July 17/3:15 PM
Contributed Presentations 5/Cabernet
SYSTEMS AND CONTROL

Nonlinear Control System Synthesis
Amir Nassirharand, University of Kentucky

Robust Controller Design Under Plant Model Uncertainties
Minh T. Tran, Texas Instruments Incorporated, Lewisville

Optimal Controller Design for Systems with Small Time-Delays
Rajab Challoo, Texas A&I University; and M.E. Sawan, Wichita State University

Estimation of Regions of Asymptotic Stability with Sliding for Relay-Control Systems
S. Mehdi Madani-Esfahani and Stanislaw H. Zak, Purdue University, West Lafayette; and Stefen Hui, San Diego State University

Theorems on Associated Transforms
Joyati Debnath, University of Wisconsin, River Falls

Practical Stabilization of Uncertain Nonlinear Dynamical Systems by Using Riccati Equations
Fumio Hamano, Florida Atlantic University

CONTRIBUTED PRESENTATIONS

Solving Two-Point Boundary Value Matrix Problems for Non-Monic Second Order Regular Systems
Lucas Jodar, Polytechnical University of Valencia, Spain

An Application of an Eigenvalue Bound to the Study of Interference Power Requirements in Adaptive Antenna Arrays
John J. Landgren and Thomas G. Pratt, Georgia Tech Research Institute

Modern Control Theory Versus Classical Control Theory - Some Illustrative Examples
Pinhas Barak, GMI Engineering, Flint, MI

Optimizing Scanning Mirror System Performance Using Piezoelectric Actuators
Michael G. Harris, University of Central Florida; and Thomas J. Tomasetti, Martin Marietta Electronics Division, Orlando, FL

Monday, July 17/3:15 PM
Contributed Presentations 6/Chenin
OPTIMIZATION METHODOLOGIES

A Modified Newton Method for Unconstrained Minimization
Anders Forsgren, The Royal Institute of Technology, KTH, Sweden; Philip E. Gill, University of California, San Diego; and Walter Murray, Stanford University

A Trust Region Algorithm for Nonlinear Inequality Constrained Optimization
Richard H. Byrd and Emmanuel Omojokun, University of Colorado, Boulder

Simultaneous Solution of the Dual Pair of Nonlinear Porgramming Problems Based on the Modified Barrier Functions
Roman Polyak, IBM T.J. Watson Research Center

The Role of Polyadic Representation in the Verification of High Order Optimality Conditions
Steven G. Miksell, Stanford Telecommunications, Inc.; and G.P. McCormick, George Washington University

A Hybrid Parallel Algorithm for Network Optimization
Robert H. Clark and Robert R. Meyer, University of Wisconsin, Madison

Smoothing and Approximation in Nondifferentiable Optimization
Marc Teboulle, University of Maryland, Baltimore County

Conjugate Gradient Optimization on a Vector Supercomputer
Dzung Le, Lucas Heights Research Laboratories, Australia

An Intelligent Algorithm for Dynamic Programming Optimization
Nazir A. Warsi and Kofi B. Bota, Atlanta University

Duality Concepts for Dynamic Programming
Cerry M. Klein, University of Missouri, Columbia

Tuesday, July 18/10:30 AM
Contributed Presentations 7/Cuyamaca
COMPUTATIONAL FLUID DYNAMICS I

A Implicit Spectral Methods for Non Linear Wave Equations
Joseph F. McGrath, Stephen B. Wineberg, Edward F. Gabl, and Charles E. Southwell, KMS Fusion, Inc., Ann Arbor; L. Ridgway Scott, Pennsylvania State University

Theory of Nonstationary Viscous Flow Past Plane Domains with Noncompact Boundaries
J.G. Heywood, University of British Columbia, Canada; and S.S. Sritharan, University of Southern California

Open Channel Flows with Submerged Obstructions
Frederic Dias, Worcester Polytechnic Institute; and Jean-Mark Vanden-Broeck, University of Wisconsin, Madison

Chaotic Streamlines in a Cubic Cavity Flow
Katsuya Ishii and Reima Iwatsu, Institute of Computational Fluid Dynamics, Tokyo, Japan; and Kunio Kuwahara, Institute of Space and Astronautical Science, Kanagawa, Japan

An Exact Subsonic Free-Surface Jet Solution
Allen C. Robinson, Sandia National Laboratories

Numerical Solution of the Hele-Shaw Equations Using a Weak Formulation
Nathaniel Whitaker, University of Massachusetts, Amherst

A Singular Free Surface Problem
John E. Molyneux, Widener University

Calculation of Flow and Transport in Porous Media Using Cellular Automata
Bryan J. Travis and Kenneth G. Eggert, Los Alamos National Laboratory

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Tuesday, July 18/10:30 AM
Contributed Presentations 8/Laguna
NUMERICAL LINEAR ALGEBRA I

Spectral Evolution of a One-Parameter Extension of a Real Symmetric Toeplitz Matrix
William F. Trench, Trinity University

Nested Epsilon Decompositions of Linear Systems: Weakly Coupled and Overlapping Blocks
M.E. Sezer, Bilkent University, Ankara, Turkey; and D.D. Siljak, Santa Clara University

Bounding the Error in Gaussian Elimination for Tridiagonal Systems
Nicholas J. Higham, Cornell University

Norm Reducing Incomplete Factorization Techniques for General Sparse Matrices
Youcef Saad and Robert Schreiber, RIACS NASA Ames Research Center

Graphical Approach to the Solution of Large Scale Least Squares Problems Using Singular Value Analysis
Sarah M. McCord, University of Washington; and Peter J. Breckheimer, California Institute of Technology

Solving Quadratically Constrained Least Squares Without Matrix Factorization
Tony Chan, University of California, Los Angeles; Don Cooley and Julia Olkin, SRI International, Menlo Park, CA

Structured Total Least Squares (STLS): a Unified Approach for Solving Structured Generalized LS and Total LS Problems
Sabine Van Huffel, Katholieke Universiteit Leuven, Belgium; and Zha Hongyuan, Konrad - Zuse Zemtri fur Informationstechnik Berlin, West Germany

Accurate Downdating of Least Squares Solutions
Ake Bjorck, Linkoping University, Sweden

Tuesday, July 18/3:15 PM
Contributed Presentations 9/Champagne Ballroom
COMPUTATIONAL FLUID DYNAMICS II

The Three Dimensional Inverse Acoustic Scattering Problem for Time Harmonic Acoustic Waves
Francesco Zirilli, Universita di Roma "La Sapienza", Italy

Predictability in Geophysical Wave Propagation
David R. Palmer, AOML/NOAA, Miami

Wave Probagation at Computational Domain Boundaries
Henry A. Warchall, University of North Texas

Non-axisymmetric Wave Propagation Through a Viscous Fluid in a Visco-elastic Tube
Qisu Zou, Kansas State University; and Yao-song Chen, Peking University, China

An Accurate Hyperbolic System for Approximately Hydrostatic and Incompressible Oceanographic Flows
Gerald L. Browning, William R. Holland, and Steven J. Worley, National Center for Atmospheric Research, Boulder; and Heinz O. Kreiss, University of California, Los Angeles

Solitary Wave Envelopes Near a Caustic
T.R. Akylas and T.-J. Kung, Massachusetts Institute of Technology

Higher-Order Drift Solitary Waves: A Unified Korteweg-deVries and Cubic Nonlinear Schrodinger Exact Solution
B.K. Shivamoggi, R.N. Mohapatra and L.C. Andrews, University of Central Florida

Heat Transfer in a Viscous Liquid Between Concentric Rotating Spheres
R.K. Bhatnagar, University of Pittsburgh, Greensburg; and H.W. Vayo, University of Toledo, OH

Perturbation Solutions of the Caret Wing
Barbara A. Wagner, Rensselaer Polytechnic Institute

A Numerical Solution to the Three-dimensional Flat Ship Problem
Susan L. Cole, Rensselaer Polytechnic Institute

Buoyant Convection Near a Solidifying Paraboloid
David Canright, Naval Postgraduate School; and Stephen H. Davis, Northwestern University

CONTRIBUTED PRESENTATIONS

Tuesday, July 18/3:15 PM
Contributed Presentations 10/Chablis
PDE's I

Free and Moving Boundary Problems in Materials Processing
Ernesto Gutierrez-Miravete, Hartford Graduate Center

Regularity of Inertial Manifolds for Semilinear Evolution Equations
Yuh-Roung Ou, ICASE NASA Langley Research Center; and S.S. Sritharan, University of Southern California

Global Existence and Asymptotic Stability of Solutions to the Cauchy Problem for Wave Propagation in Nonlinear Dielectric Media
Frederick Bloom, Northern Illinois University

Moving Mesh Techniques and Mixed Finite Element Methods
Todd Dupont, University of Chicago; and Sonia M.F. Garcia, U.S. Naval Academy

A Grid Refinement 3D Helmholtz Solver
Richard H. Burkhart, Boeing Computer Services, Seattle

Numerical Methods for Heat Equation Where the Diffusion Coefficient Changes Sign
Jinn-Liang Liu, University of Maryland, Baltimore County

Convergence of Numerical Methods for the One-Dimensional Stefan Problem
Anne C. Morlet, California Institute of Technology; and David L. Brown, Los Alamos National Laboratory

On An Implicit Factored Finite Difference Scheme for Viscoelastic Flow Simulation
Haiqing Gong and Selcuk I. Guceri, University of Delaware

Higher Order Accurate Asymptotic Factorization of Operators
Charlie H. Cooke and Andrew G. McMorran, Old Dominion University

A Mollified Space Marching Finite Differences Algorithm for the Inverse Heat Conduction Problem with Slab Symmetry
Lijia Guo, Diego Murio and C. Roth, University of Cincinnati

Tuesday, July 18/3:15 PM
Contributed Presentations 11/Laguna
SIGNAL PROCESSING

Signal Processing on Finite Groups
Richard B. Holmes, MIT Lincoln Laboratory

Unified Signal Algebras
Charles R. Giardina, CUNY

Signal Processing Using Zero-Crossing Techniques
Farokh A. Marvasti and Reda H. Seireg, Illinois Institute of Technology

Constructing Waveforms with Low Peak Signal to Power Ratios
D. Hajela, Bellcore, Morristown

Minimum Free Energy Spectral Estimation
Joseph M. Pimbley, Rensselaer Ploytechnic Institute; and Seth D. Silverstein, General Electric Corporate Research and Development, Schenectady

Fast FIR Implementations on the Alliant FX/8 Computer
Domingo Rodriguez, University of Puerto Rico, Mayagüez

Exact and Uniform Perturbation Solutions of the Weyl Composition Equation
Louis Fishman, Colorado School of Mines

Aperture for Kirchhoff Inversion
Jack K. Cohen, Colorado School of Mines

Inversion of Narrow Aperture Data Sets
Norman Bleistein and Jack K. Cohen, Colorado School of Mines

Wavelets: New Families of Orthogonal Functions
Gilbert Strang, Massachusetts Institute of Technology

Tuesday, July 18/3:15 PM
Contributed Presentations 12/Chenin
STATISTICS AND PROBABILITY

Performance Modeling of Tracking Systems with Stochastic Dynamics
Craig S. Peters and C. Christopher Reed, The Aerospace Corporation, Los Angeles

Equivalence of Stochastic Averaging and Stochastic Normal Forms
N. Sri Namachchivaya and Gerard Leng, University of Illinois, Urbana

Efficiency of a Rollback Simulation Algorithm
Boris D. Lubachevsky and Alan Weiss, AT&T Bell Laboratories, Murray Hill; and Adam Shwartz, Israel Institute of Technology

An Optimized Neural Net for Class Recognition
Richard M. Crownover and James M. Keller, University of Missouri, Columbia

Generating a Random Permutation Satisfying a Partial Order
Peter Matthews, University of Maryland, Baltimore County

Minimum Distance Estimation of a Generalized Probability Curve With Robust Alternatives
Jesse W. Proctor, Hawthorne, CA

The Performance of Dorfman's Group Testing Procedure on a Markov Chain of Items
Kenneth E. Schwartz, University of Toledo, OH

Optimization Problems in Reducing the Dimension of a Multivariate Data Set
Michael W. Trosset, Tucson, AZ

Two-Server Queue with One Server Idle Below a Threshold
John A. Morrison, AT&T Bell Laboratories, Murray Hill

Wednesday, July 19/3:15 PM
Contributed Presentations 13/Laguna
PARALLEL PDE's

Explicitly Parallel Algorithms for Hyperbolic PDEs–A Proof of Principle
Patrick Haven Worley, Oak Ridge National Laboratory

Parallel Computation of Conservation Laws
Marc Garbey, Ecole Normale Superieure de Lyon, France; and David Levine, Argonne National Laboratory

A Computational Strategy for the Finite Element Method on a Memory-sharing Machine
Jenn-Ching Luo and Morton B. Friedman, Columbia University

Shared Memory vs. Distributed Memory for Schwarz Splitting
Calvin J. Ribbens and Layne T. Watson, Virginia Polytechnic Institute and State University

Flexible Mesh Refinement
William D. Gropp, Yale University

Galaxy Modeling in a Parallel Environment
Y.S. Cooper and David Edward Orcutt, University of Nevada, Las Vegas

QCD on Parallel Supercomputers
Clive F. Baillie, California Institute of Technology

Solving the Time-dependent Schrodinger Equation on a Hypercube Multiprocessor
Martin H. Schultz and Faisal Saied, Yale University

2D Unstructured Mixed Density Grids with Laplacian Smoothing
Robert E. LaBarre, United Technologies Research Center

A New IST Numerical Scheme for the Nonlinear Schrodinger Equation
Thiab R. Taha, University of Georgia

Wednesday, July 19/3:15 PM
Contributed Presentations 14/Mission Courts South
COMPUTATIONAL FLUID DYNAMICS III

Solutions for Unsteady Vortical Disturbances Around a Flat Plate
S.I. Hariharan, University of Akron

Approximate Eigensolutions for Rotating Compressible Flows
Richard J. Babarsky, James Madison University; and Houston G. Wood, University of Virginia

Nonlinear Structures of Conservation Laws for 2D Shock Waves
Gholam-Ali Zakeri, University of Wisconsin, La Crosse

Asymptotic Boundary Conditions for Computational Aerodynamics
Thomas Hagstrom, SUNY, Stony Brook and ICOMP, NASA Lewis Research Center; and S.I. Hariharan, University of Akron and ICOMP, NASA Research Center

On Nonlinear Galerkin Methods for the Navier-Stokes Equations
Edriss S. Titi, Cornell University

CONTRIBUTED PRESENTATIONS

Numerical Treatment of the Pressure Singularity in Domains with Re-entrant Corners
Gerardo A. Ache, Universidad Central de Venezuela

Quenching of Diverging Detonations
Bruce G. Bukiet, Los Alamos National Laboratory

The Caterpillar Belt Flow Problem
Calvin J. Ribbens and Layne T. Watson, Virginia Polytechnic Institute and State University; C.-Y. Wang, Michigan State University; and Kevin A. Alexander, Michelin MARC, Greenville, SC

Wednesday, July 19/3:15 PM
Contributed Presentations 15/Chenin
DISCRETE MATHEMATICS

Testing, Embedding, and Drawing Planar Graphs
Joel F. Small, Naval Ocean Systems Center, San Diego

Synthesis of Boolean Neural Networks
Andrew T. Ogielski, AT&T Bell Laboratories, Murray Hill

A Graph-Theoretic Approach to Proper Dimensioning of Engineering Machine Drawings
Dov Dori, University of Kansas

On the Integrity of Products of Graphs
Kunwarjit S. Bagga, Lowell W. Beineke, Marc J. Lipman, and Raymond E. Pippert, Indiana University-Purdue University, Fort Wayne

On Minimal Rectilinear Steiner Trees in All Dimensions
Timothy Law Snyder, Georgetown University

Consistent Labeling for Line Drawings
Thanh Thuy T. Nguyen, Texas Instruments Incorporated, Plano

Diophantus, Graphs, Networks, and Stoichiometry
Bruce Jeffrey Layman, Spokane, WA

A Unified Graph Representation of Imperative Programs and Applications
Narayan C. Debnath, University of Wisconsin, River Falls

Thursday, July 20/10:30 AM
Contributed Presentations 16/Mission Courts South
ODE's I

Computational Singular Perturbation for Boundary Layer Type O.D.E.s.
S.H. Lam and D.A. Goussis, Princeton University

A Method of Solving Singularly Perturbed Systems Containing Singular Manifolds
Zhong-mei Gu, Rensselaer Polytechnic Institute

A Matrix Free Implicit Runge-Kutta Method
Jeff V. Richard, Science Applications International Corporation, San Diego; and Kris Stewart, San Diego State University

Stability Enhancement of Explicit Boundary Value Runge-Kutta Methods
Aron Jazcilevich and Reginald P. Tewarson, SUNY, Stony Brook

Secant Approximations in an Implicit Runge-Kutta Solver for Stiff ODEs
Gordon Shamblin and Kris Stewart, San Diego State University

Using Broyden Updates to Approximate Jacobians in a Semi-Implicit BDF Code
Laura Knight, Naval Ocean Systems Center; and Kris Stewart, San Diego State University

The Method of Spectral Deferred Correction for Ordinary Differential Equations
Leslie Greengard and Vladimir Rokhlin, Yale University

Numerical Computation and Continuation of Invariant Manifolds Connecting Fixed Points
Eusebius J. Doedel, Concordia University, Montreal, Canada; and Mark J. Friedman, University of Alabama, Huntsville

Thursday, July 20/10:30 AM
Contributed Presentations 17/Chenin
O.R./ECONOMICS

Generalized Scalings Satisfying Linear Equations
Uriel G. Rothblum, Technion-Israel Institute of Technology

Mesh Independence of the Armijo Rule for Infinite Dimensional Problems
C.T. Kelley, North Carolina State University; and E.W. Sachs, Universitat Trier, West Germany

Single Machine Scheduling with Preemption Penalties
Marc E. Posner and Rakesh V. Vohra, Ohio State University, Columbus

A Bivariate Optimizing Algorithm Simulates Alternative Economic Policies
Mirek Karasek, PCA-IAP, Research & Development, Saudi Arabia

Internalizing Externalities and Parallel Computing
Mohamed El-Hodiri, University of Kansas

A Maxwell-Boltzmann Entropy Model of the Appalachian Steam Coal Market
Chin W. Yang, Clarion University of Pennsylvania

Bounded Sensitivity of the Linear Leontief Model: A Diagnostic Index for the U.S. Economy
Chin W. Yanglt, Clarion University of Pennsylvania; Anthony Loviscek, Indiana University-Purdue University, Fort Wayne; and Ahmad Afrasiabi, Allegheny College

Thursday, July 20/3:45 PM
Contributed Presentations 18/Chablis
OPTIMAL CONTROL

Singularly Perturbed Control of the End-Temperature in a Long Slab
Arthur K. Gautesen, Iowa State University; and W. Edward Olmstead, Northwestern University

Optimal Control Theory of Navier Stokes Equations
S.S. Sritharan, University of Southern California

Matrix Continued Fractions and Riccati Equations
Calvin D. Ahlbrandt, University of Missouri, Columbia

Neutral Interconnections in Decentralized Optimal Control of Discrete Time Linear Systems
Massoud Sinai, Rockwell International, El Segundo, CA; and Bahram Shahian, California State University, Long Beach

Optimization in Complex Systems
Vladimir A. Staroselsky, Transportation Systems Center at Boston of the U.S. Department of Transportation

Identification of Parameters for Partial Differential Equations in the Presence of Noisy Data
Frank Mathis, Baylor University

Nonlinear Filtering for Image Restoration
Mou-Hsiung Chang, University of Alabama, Huntsville

Adaptive Grids for Surface Interpolation
Jose E. Castillo, San Diego State University; and Lars Kai Hansen, Andrex Radiation Products A/S, Copenhagen, Denmark

Thursday, July 20/3:45 PM
Contributed Presentations 19/Cuyamaca
DYNAMICAL SYSTEMS/MECHANICS

Cracks in Vanishingly Thin Inhomogeneities
Chien H. Wu, University of Illinois, Chicago

Thermal Shock Failure in Microelectronic Components: Model and Experiment
Geoffrey C. Scott, AT&T Bell Laboratories, Princeton; and Greg Astfalk, Convex Computer Corporation, Greenbelt, MD

The Linear Thermoelastic Problem for a Strip with a Line Crack Parallel to its Edges
S. Davidson, G. Melrose and J. Tweed, Old Dominion University

Asymptotic Solution for Elastohydrodynamic Lubrication
Edward J. Bissett, GM Research Laboratories, Warren, MI

Models for Structured Populations
George N. White III, Bedford Institute of Oceanography, Canada

On the Numerical Solution of Euler-Lagrange Equations
Edward J. Haug, Florian A. Potra and Jim Yen, University of Iowa

Hamiltonian Chaos and Breakdown of Uniformly Rotating States
Paul K. Newton, University of Illinois, Urbana

To Reconstruct the Foundations of Newtonian Mechanics by Mathematical Approaches
Shu Zhongzhou, Southwestern Jiaotong University, People's Republic of China

CONTRIBUTED PRESENTATIONS

Thursday, July 20/3:45 PM
Contributed Presentations 20/Chenin
NUMERICAL ANALYSIS

Optimal Chebyshev Polynomials on Two Disjoint Intervals
Bernd Fischer, Stanford University

Taylor Series Solution of a Class of Singular Diffusion Problems in Physiology
N.S. Asaithambi and J.B. Garner, Mississippi State University

A Fast Algorithm for the Evaluation of Legendre Expansions
Bradley K. Alpert and Vladimir Rokhlin, Yale University

A New Polynomial Equation Solver
T.E. Hull and R.A. Mathon, University of Toronto, Canada

Modified Schwarz-Christoffel Transformations
Louis H. Howell, Massachusetts Institute of Technology

Nonlinear Iterative Relaxation Methods in Remote Sensing
Alvaro R. De Pierro, State University of Campinas, Brazil

A Teaching Package for Numerical Analysis
James L. Buchanan and Peter R. Turner, U.S. Naval Academy

A Reliable Root Solver for Automatic Computation
Xingren Ying, Chinese Academy of Sciences, Beijing, PRC; and I. Norman Katz, Washington University, St. Louis, MO

Barycentric Formulae for Some Rational Functions Involving Blaschke Products
Jean-Paul Berrut, Universite de Fribourg, Switzerland

Friday, July 21/10:30 AM
Contributed Presentations 21/Chablis
NUMERICAL LINEAR ALGEBRA II

Algorithms for Computing the Closest Orthogonal Matrix to any 3 x 3 Matrix
John N. Johnson and James W. Burrows, Boeing Computer Services, Seattle

A New Matrix Decomposition Algorithm
L. Magnus Ewerbring and Franklin T. Luk, Cornell University

It is Time to Resurrect the LR Algorithm
David S. Watkins, Washington State University

Computing Accurate Eigenvalues by Inverse Iteration
Ilse C.F. Ipsen and Elizabeth R. Jessup, Yale University

On a Block Implementation of Hessenberg Multishift QR Iteration
Z. Bai and J. Demmel, Courant Institute of Mathematics, New York University

Using Partial Correlations to Compute Eigenvalues and Singular Values
Jaen-Marc Delosme and Ilse C.F. Ipsen, Yale University

Non-normal Matrices, "Approximate Eigenvalues", and Numerical Algorithms
Lloyd N. Trefethen, Massachusetts Institute of Technology

Friday, July 21/10:30 AM
Contributed Presentations 22/Laguna
O.D.E.'s II

Some Numerical Characteristics of Zone Fire Models
Glenn P. Forney and Leonard Y. Cooper, National Institute of Standards and Technology; and William F. Moss, Clemson University

Stiff Equations Arising in Fire Modeling
William F. Moss, Clemson University; and Glenn P. Forney, National Institute of Standards and Technology

Numerical Solutions of Transistor Equations
Rakesh K. Sharma, Northern Illinois University

Construction of Velocity and Density of a Layered-Medium Using the Goupillaud Approach
M.A. Hooshyar, University of Texas, Dallas

Mathematical Analysis of a Model Switched-Mode Power Supply
Gregory A. Kriegsmann, Northwestern University

A Computational Approach for Locating All the Roots of a Vector Function
Pedro J. Zufiria and Ramesh S. Guttalu, University of Southern California

Limits of Virtual Lateral Inhibition in Parallel Activation Models
Michel Benaim and Manuel Samuelides, ONERA/CERT and Ecole Nationale Superieure de l'Aeronautique et de l'Espace, France

Friday, July 21/10:30 AM
Contributed Presentations 23/Chenin
COMPUTER SCIENCE II

Decomposing Chinese Remaindering for Systolic Arrays
Cetin K. Koc, University of Houston, University Park; and Peter R. Capello, University of California, Santa Barbara

Equivalence Classes of Hierarchical Clusterings and Distributions of Statistics
Christos Nikolopoulos, Bradley University

Properties of Generalized Barker Sequences
Ning Zhang, Pacific Bell, San Ramon, CA

Techniques for Integrating Symbolic and Numeric Computations
H.O. Tan, University of Akron

An Algorithm for Planning Parallel Machines
Roberto Semenzato, Universita di Padova, Italy

Level-Index: Arithmetic for Parallel Architectures
Peter R. Turner, U.S. Naval Academy

Multitasking on the Cray-2 and Cray Y-MP: An Experimental Study
Rod Fatoohi, NASA Ames Research Center

Friday, July 21/2:00 PM
Contributed Presentations 24/Champagne Ballroom
PARALLEL NLA II

Distributed Sparse Orthogonal Factorization
Alex Pothen and Padma Raghavan, Pennsylvania State University

A Fault Tolerant Technique for Matrix Computing
Joan E. Carletta and Franklin T. Luk, Cornell University

Incremental Condition Estimation and Applications
Christian H. Bischof, Argonne National Laboratory

On Reflexive and Antireflexive Matrices
Hsin-Chu Chen, University of Illinois, Urbana

Parallel Performance of Iterative Method for Solving Nonsymetric Linear Systems on Hypercubes
Shu-Mei Cheng, University of Virginia

Performance of a Variational Algorithm for Approximating the Inverse of Sparse Banded Matrices
Jerry F. Magnan and Richard Bertram, Florida State University

A Parallel Algorithm for Computing Banded Matrices for Dense Matrices
Wesley M. Conner and Bruce W. Suter, University of Alabama, Birmingham

Friday, July 21/2:00 PM
Contributed Presentations 25/Chablis
PDE's II

Quasi-Linear Parabolic-Hyperbolic Singular Perturbation Problem: Asymptotic Analysis and Numerical Computation
Marc Garbey, Ecole Normale Superieure de Lyon, France

Semidiscrete Nitsche Approximation of Parabolic Boundary Value Problems
Irena Lasiecka, University of Virginia; and Gilbert Choudury, University of Cincinnati

Weakly Non-uniform Thermal Effects in a Porous Catalyst
Francisco J. Mancebo and Jose M. Vega, Universidad Politecnica de Madrid, Spain

A Fully Implicit Monte Carlo Method for Solving the Non Linear Radiative Transfer Equations
T. N'Kaoua, Centre d'Etudes de Limeil Valenton, France

Some Variational Inequalities for a Class of Linear Magnetoresistors
Daniel R. Baker, GM Research Laboratories

Bifurcation Methods for Free Boundary Problems
M. E. Brewster, Rensselaer Polytechnic Institute

Adaptive Spectral Collocation Methods for Hyperbolic Equations
Jeffrey M. Augenbaum, University of Connecticut, Storrs

Hankel Transform Type Integrals and Applications
Mihr J. Shah, Kent State University, Warren

POSTER SESSIONS

An Approximate Boundary Condition for Structural Acoustic Interactions
Clyde Scandrett, Naval Postgraduate School; and Greg Kriegsmann, Northwestern University

Scattering by Two Dimensional Periodic Structures
Brian J. McCartin, United Technologies Research Center, East Hartford; and Gregory A. Kriegsmann, Northwestern University

An Approximate Boundary Condition for Scattering by Two Dimensional Periodic Structures
Gregory A. Kriegsmann, Northwestern University; and Brian J. McCartin, United Technologies Research Center, East Hartford

Analytic Solution by Decomposition of a Nonlinear Dissipative Wave Equation
G. Adomian, University of Georgia

Friday, July 21/2:00 PM
Contributed Presentations 26/Rose
ANALYSIS

The Squeezing of Red Blood Cells Through Parallel-sided Channels with Near-minimal Widths
D. Halpern and T.W. Secomb, University of Arizona

A Computational Model for Cognition
William C. Hoffman, Sierra Vista, AZ

Eigenfunctions of Operators That Model Multiple-pinhole Tomographic Imaging Systems
John N. Aarsvold and Harrison H. Barrett, University of Arizona

A Category-Theoretic Approach to Data Modeling
Ronald K. Pearson, Du Pont Experimental Station, Wilmington, DE

Shape Reconstruction of Two-dimensional Non-convex Bodies
Nasit Ari, Lafayette College

Recovery of Discontinuities Using a Parametric Form of Regularized Inversion
Bryan J. Travis, Los Alamos National Laboratory

A Velocity Inversion Problem Involving an Unknown Source
Paul E. Sacks, Iowa State University

Polarization Dynamics for Optical Fiber Solitons
David J. Muraki and William L. Kath, Northwestern University

An Iterative Method to Compensate for the Interpolation Distortion
S. Aghagolzadeh, Purdue University; and Farokh A. Marvasti, Illinois Institute of Technology

Snell's Law in Normed Linear Planes
Mostafa Ghandehari, Naval Postgraduate School

Thursday, July 20/3:45PM
Poster Session 1/Exhibit Hall

An Optimal Preconditioner of Interval Gauss-Seidel Method
Chenyi Hu and Baker Kearfott, University of Southwestern Louisiana

Vector Implementation of Orthogonal Transforms for Image Coding Applications
Mohamed El-Sharkawy, Bucknell University

Graphical Stochastic Dominance
William E. Stein, Texas A&M University, College Station; and Philip J. Mizzi, Arizona State University, Phoenix

Application of Importance Sampling in Uncertainty Analysis
Seung C. Chay, Westinghouse R&D Center, Pittsburgh, PA

Improved Data Locality in LU Decomposition
Roderic Murufas, Sparta, Inc., Anaheim

Application of Stable Solvers of Singular Linear Systems to Block Linear Systems
W. Govaerts, University of Ghent, Belgium

Systolic Adaptive Feedback Controllers Based on Orthogonal Transformations
Purusottam Mookerjee, Villanova University

An Iterative Method for Approximating the Eigenvalues of a Quadratic Operator Pencil
Roman I. Andrushkiw, New Jersey Institute of Technology

A Study of Inverse Systems
Farokh A. Marvasti and Chuande Liu, Illinois Institute of Technology

Adaptive Predictive Transform Control
Erlan H. Feria, CUNY, Staten Island

Parallel Matrix Algorithms on the Symult 2010
Robert A. van de Geijn, University of Texas, Austin

Special Notice to Contribued Presentation Authors and Chairs of Contributed Presentation Sessions:

Fifteen minutes are allowed for each contributed presentation. Presenters are requested to spend a maximum of twelve minutes for their presentations, and three minutes for questions and answers.

Please note:

For presentations with more than one author, an underlineation is used to denote the author who will present the paper.

Friday, July 21/2:00 PM
Poster Session 2/Exhibit Hall

The Development of An Integrated Computer Classroom
Richard A. Alo, University of Houston-Downtown

Some Implementation Issues Associated with Multidimensional Interval Newton Methods
John J. Dinkel and Marietta J. Tretter, Texas A&M University, College Station; and Danny Wong, Chinese University of Hong Kong

A New Extension of Slender Body Theory
James F. Geer, State University of New York, Binghamton; and Carl M. Andersen, College of William and Mary

Asymptotic and Exceedance Properties of a Non-Gaussian Random Process Model of Atmospheric Turbulence
David S. Newman, Boeing Computer Services, Seattle

A Comparison of Euler and Navier-Stokes Solutions Generated by the Piecewise-Parabolic Method (PPM)
Paul R. Woodward and Wei Yang, University of Minnesota

New Methods for Nonlinear Mechanics in Particle Accelerators
Robert L. Warnock, Stanford University

Automatic Mathematical Catastrophe ("Autmathcat") At Even Integer Dimensionality Superuniversality in Mathematics Dominating Physics: Synergetics Paradigm and Dichotomy Superuniversality Class and Crossover Principle of Complexity via Parsimony
Edward Siegel, Synergetics Paradigm & Dichotomy, San Francisco

Some Results on 'Locking'
Manil Suri, University of Maryland, Baltimore County

Hybrid Perturbation-Galerkin Solutions of Nonlinear Oscillator Equations
Carl M. Andersen, College of William and Mary; and James F. Geer, SUNY, Birmingham

Solutions to a Benchmark Problem Involving Periodic Viscous Entrance Flow in a Semi-Infinite Circular Tube
I.S. Goldberg, St. Mary's University; G.F. Carey, R. McLay, and L. Phinney, University of Texas, Austin

TRANSPORTATION

BY AIR

United and ***Delta*** Airlines have been chosen as the official carriers for this meeting. You can fly to San Diego and save on travel from July 13-24, 1989 inclusive.

UNITED DELTA

In a special arrangement with SIAM, United and Delta Airlines are offering you the services of their toll free convention reservation desks, along with a complement of discounts:

- 5% off any regularly discounted fare for which you qualify, including First Class and Ultra Saver Fares.
  THE DISCOUNTS CAN RANGE FROM 40% - 70% OFF NORMAL COACH FARES!

OR. . . .for those of you who do not qualify for the above discounts

- *United* and *Delta Airlines* will offer a minimum of 40% off regular coach fares. There is no minimum stay or advance purchase required with United Airlines or Delta Air Lines.
- *United* and *Delta Airlines* have a special discounted fare that we at SIAM encourage you to ask for. It does involve staying overnight either the Saturday before or after the conference. However, in many cases the cost of the hotel for the extra night is still cheaper than paying the airfare to arrive on a Sunday and depart on a Thursday or Friday.

To make reservations for one of the above discounted fares:

- Call United Airlines Convention Desk, at 1-800-521-4041, seven days a week 8:00 AM to 11:00 PM Eastern Time. *Be sure to mention the SIAM account number: 9026A*
- Call Delta Air Lines Convention Desk, at 1-800-241-6760, seven days a week 8:00 AM-8:00 PM Eastern Time. *Be sure to mention the SIAM account number: U0135.*
- Both United and Delta Airlines will arrange to mail your tickets to your home or office, or you may purchase them from your local travel agent. *If you purchase from your local travel agent, be sure you or the agent call United or Delta's Convention Desk to make your reservations. The special SIAM fare is only available through the Convention Desks.*

CAR RENTAL

Budget Rent A Car has been selected as the official car rental agency for the 1989 SIAM Annual Meeting. The following rates will apply:

Type of Car	Daily Rate	Weekly Rate
Economy	$30.00	$140.00
Compact	$32.00	$176.00
Intermediate	$34.00	$187.00
Full-Size 2 dr.	$36.00	$198.00
Full-Size 4 dr.	$38.00	$209.00
Luxury	$39.00	$249.00

- These rates are valid July 9-28, 1989 and are available at the airport location and the 4955 Ruffner Road location.
- Daily and Weekly rates include unlimited mileage

Rental Requirements

- Cars must be picked up and dropped off at the same location.
- You must be 21 years of age and have a valid U.S. or International Driver's License
- You must have one of the following credit cards to rent a car: AMEX, Master Card, VISA, Diners Club or Sears
- The prices quoted do not include refueling services, tax, optional collision damage waiver, and personal accident insurance.

Reservations

We encourage you to make an advance reservation, as on-site availability cannot be guaranteed. Make reservations by calling: 1-800-772-3773. *Be certain to mention that you are attending the 1989 SIAM Annual Meeting, July 16-21, 1989 in San Diego, in order to receive the discounted rates.*

BY CAR

From the Airport by Car

From the airport, you will be able to see the Sheraton Harbor Island Hotel. When leaving the airport get on Harbor Drive and head towards downtown. There is a ramp to get onto the Harbor Drive and once there, there will be a Y in the road. Take a left at this Y and proceed on to Harbor Island Drive. The first driveway on the right takes you to the Sheraton Harbor Island Hotel.

From Points North or South

Take Highway 5 South if coming form the North and take Highway 5 North if coming from the South. Follow Highway 5 until you see signs for the San Diego Airport. Proceed all the way to the airport. When you approach the airport, you'll be on Harbor Drive. Make a right on Harbor Island Drive. The first driveway on the right takes you to the Sheraton Harbor Island Hotel.

HOTEL INFORMATION

Sheraton Harbor Island East
1380 Harbor Island Drive
San Diego, CA 92101
(619) 291-2900

The Sheraton is located directly on the San Diego Bay which makes it easier for you to enjoy watching the boats sail into the sunset on either a private balcony or patio which each room has. For your enjoyment, the hotel is equipped with two swimming pools and a hydro-jet pool. There is sailing, fishing, racquetball, health club, sauna, and bicycling right at the hotel. For those of you who enjoy jogging, the Sheraton has over 5-miles of jogging trails. You can even take a Bay Cruise from their private docks. We urge you to bring the necessary items to enjoy some of the facilities that will be available to you while staying at the Sheraton.

SIAM is holding a block of rooms at the Sheraton Hotel. These rooms are being held on a first come, first served basis at $76 (Single) and $91 (Double). *These rooms will be held for our exclusive use only until June 23, after which date reservations will depend on availability.*

We urge you to make your reservations as soon as possible. You may do so by telephoning (619) 291-2900 or by mailing in the Hotel Reservation Form, located in the back of this program. When making your reservation via phone, please be certain to identify yourself as an attendee at the 1989 SIAM Annual Meeting to receive the discounted rate.

Late Arrivals: A deposit equal to one night's stay is required to hold each reservation for arrivals after 6:00 PM. No deposit will be required for those arriving before 6:00 PM.

Check In: Check-in time is 3:00 PM and Check-out time is 12:00 PM. *If you need to change or cancel your reservation, be certain to contact the hotel at least 24 hours in advance of the stated date of your arrival to avoid any unnecessary charges.*

Dining: The Sheraton Hotel has two restaurants. The Cafe Del Sole gives you the feeling of a sidewalk cafe and serves breakfast, lunch and dinner. The cafe is open 6:00 AM-12:00 PM and the prices range between $4.00 and $16.00. For more elegant dining, Sheppard's is where you will want to venture. Sheppard's is only open for dinner, 6:00 PM-10:00 PM,,and the prices range between $19.50 and $25.00. For late night snacks, the hotel does provide 24 hour room service. Should you want to visit the downtown area, you will find restaurants for any type of cuisine that you are looking for. To get downtown, you can either take a cab from the front of the hotel, (the cost is $5.00-$8.00 each way) or you can take the complimentary shuttle to the airport and catch the city bus which runs every 10 minutes for $1.00.

About the weather: San Diego was voted by meteorologists the "only area in the U.S. with perfect weather". The average annual temperature is 70 degrees. Most daily forecasts show San Diego to be mild, warm and sunny. The climate is ideally suited for year-round outdoor activity. The moderate climate and resort atmosphere contribute to a relative informal style of dress. Since the evenings along the Coast get chilly, a sweater or jacket is in order all year. A few of the city's more exclusive restaurants require a coat and tie for gentlemen, but most welcome casual attire.

BUSES/SIGHTSEEING

Being described as the "only area in the U.S. with perfect weather", no matter what plans you make in San Diego, it is sure to be an enjoyable experience. In order to assist attendees and their guests with transportation and site- seeing while in San Diego, SIAM will provide transportation to the following areas for your enjoyment.

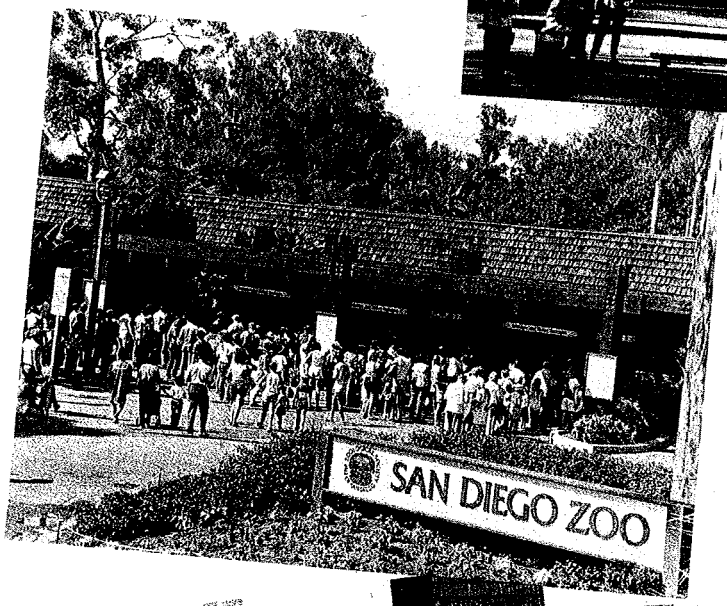
HORTON PLAZA with its restored facades and art-deco style architecture is sure to be an exciting adventure for those of you looking for a shoppers paradise.

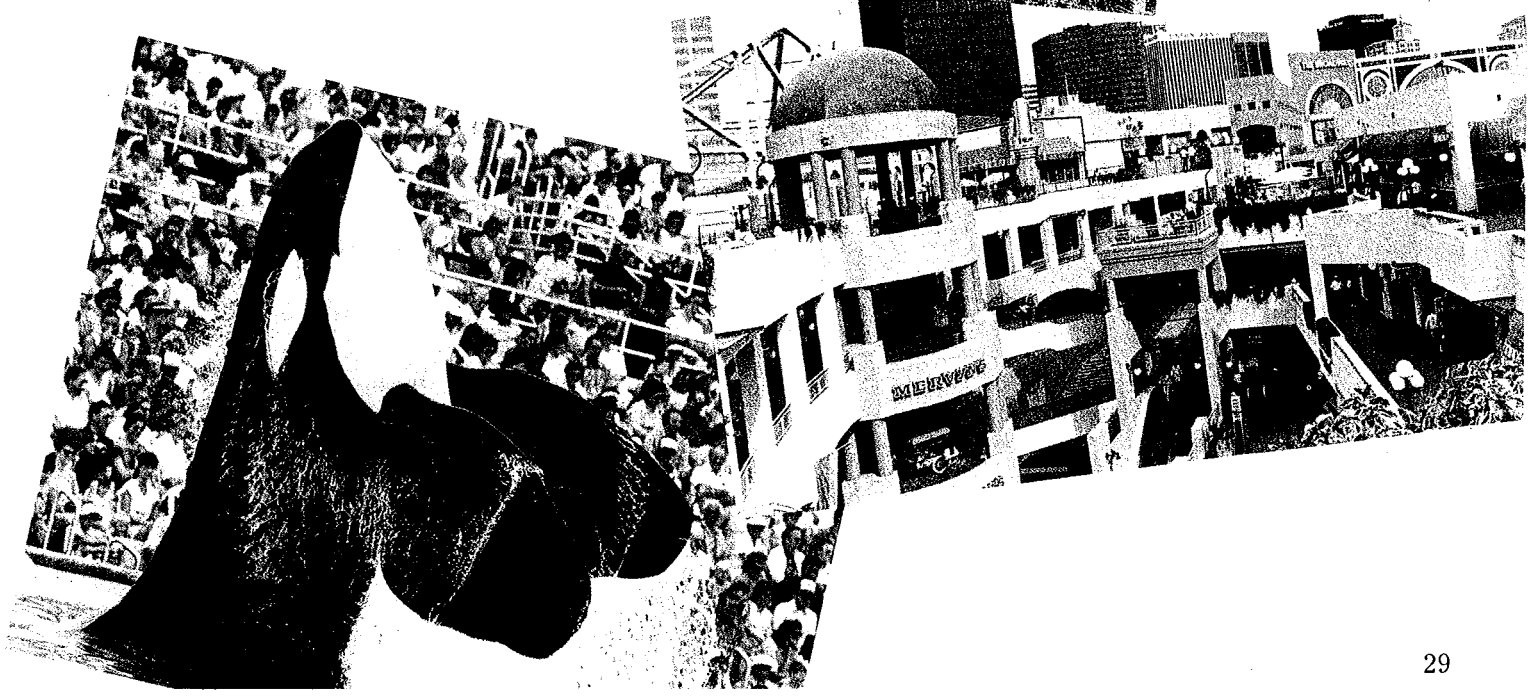
SAN DIEGO ZOO: Visit the famous San Diego Zoo, located in beautiful Balboa Park. Here more that 3,600 animals live with a conspicuous absence of wire cages, including many that are among the rarest in the world! Most of the 1200 species are living in enclosures that are as much like their natural habitat as possible. We suggest that you wear comfortable shoes since the zoo is built on a number of hills. You may want to tour the Children's Zoo where everyone delights in seeing the babies! Baby primates and mammals in the nursery as well as otters, pandas, spider and squirrel monkeys will entertain you face-to-face. There are many fast-food type stands throughout the zoo, with picnic tables and benches located throughout the park.

SEA WORLD: A trip to San Diego just isn't complete without a visit to Sea World, the home of baby Shamu. The 110-acre park has landscaped grounds and gardens that bloom profusely year round. Sea World features 7 different shows including Shamu, the killer whale, performing in a 6-million gallon tank of water. Other shows are the very funny Spooky-Kooky Castle with performances by sea lions and sea otters. The porpoise/dolphin show on the picturesque lagoon is also a favorite. In between shows, you can also explore the 35 different exhibits that sea world has to offer. There is a petting and feeding pool for dolphins and porpoises and a sea lion outdoor enclosure where you can buy fish and feed the noisy barking creatures. There are lots of fast-food restaurants, serving seafood, mexican, pizza, ice cream, beer, and chicken. Each night in the summer there is a fireworks display at 10:00 PM.

OLD TOWN: Here you will see where San Diego first started. This is the sight of the first settlers to the area. The town is filled with spanish architecture and ambiance. There are many parks and museums to brouse through as well as small boutiques and shops. This entire area is influenced by the Latin-American culture and is visable in the items that are sold as well as the types of foods available. This is a must to those interested in the past.

BUSES: At the Sheraton Harbor Island East, there is Molly the Trolley, a bus that goes to each of the above locations everyday. It leaves from the hotel every two hours. The cost is $5.00 for an all day pass to ride the trolley. The schedule and tickets can be acquired at the Conseigere Desk of the Hotel. For those wishing to go into downtown San Diego, there will be a free bus service from the hotel Monday thru Thurday eveinings, 6:30 PM - 11:30 PM. Free bus information can be acquired at the SIAM Registration Desk, located outside the Champagne Ballroom before 5:00 PM each day.





REGISTRATION INFORMATION

Please complete the Advance Registration Form found on the back page of this brochure and return it in the envelope provided in the middle section of this program. We urge attendees to register in advance as the registration fee is lower for advance registrants. Advance registration must be received by July 10, 1989. The registration desk will be open as listed below.

Saturday, July 15,	5:00 PM - 9:00 PM
Sunday, July 16	8:00 AM - 8:00 PM
Monday, July 17	7:00 AM - 5:30 PM
Tuesday, July 18	7:30 AM - 5:30 PM
Wednesday, July 19	7:30 AM - 5:30 PM
Thursday, July 20	7:30 AM - 5:30 PM
Friday, July 21	7:30 AM - 3:30 PM

REGISTRATION FEES:

		SIAM Member	Non-Member	Student
Short Course	Advance	$110	$130	$65
	On-Site	$130	$150	$85
Meeting	Advance	$100	$125	$15
	On-Site	$120	$145	$15

SOCIAL EVENTS

Welcoming Reception
Sunday, July 16, 8:00 PM - 10:00 PM
Chablis Room
Cash Bar

Beer Party
Monday, July 17, 6:15 PM - 8:00 PM
Harbor Terrace
Beer, assorted sodas, mini hamburgers, mini pizzas, hot dogs on a stick, chicken wings, fried zucchini and mushrooms, fresh fruit kabobs, chip and dip tray.
Cost: $15.00

Harbor Dinner Cruise
Wednesday, July 19, 6:30 PM - 9:30 PM
Enjoy the view of the city skyline as you cruise by the magnificent sights of the San Diego Harbor while listening to the melodic sounds of a piano. There will be a sit-down dinner served on the cruise consisting of dinner rolls, tossed salad with ranch dressing, New York strip steak cabernet, Italian baked tomato, carrots, chocolate mousse cake and wine. There will be a cash bar available for those wishing to purchase additional drinks. The boat will pick up and drop off passengers at the hotel.
Cost: $30.00

Stragglers Buffet
Friday, July 21, 6:30 PM
Harbor Terrace
This buffet is especially designed for those of you who will not be leaving until Saturday and yet want one more opportunity to get together with your colleagues. The buffet will consist of tossed salad, carrot and onion salad, pasta salad, vegetable crudite, vegetable lasagna, coq au vin, braised brisket of beef with piquash sauce, lyonnaise potatoes, stir fried vegetables, assorted pastries, bread and rolls and coffee, tea or milk. A cash bar will be available for any additional drinks.
Cost: $28.00

Non SIAM Members
Non-member registrants are encouraged to join SIAM in order to obtain the member rate for meeting registration and enjoy all the other benefits of SIAM membership. You can join SIAM by filling out a membership form at the SIAM Registration Desk located outside the Champagne Ballroom of the Sheraton Harbor Island Hotel. If you join for this meeting, SIAM will retroactively give you the member rate for registration. The SIAM membership fee is $60.00.

Special Note
There will be no prorated fees. No refunds will be issued once the meeting has started.

If SIAM does not receive your Advance Registration Form by the stated deadline, you will be asked to give us a check or a credit card number at the conference. We will not process either until we have ascertained that your registration form has gone astray. In the event that we receive your form after the conference, we will destroy your check or credit card slip.

Telephone Messages
The telephone number at the Sheraton Harbor Island is (619) 291-2900. The Sheraton will either connect you with the SIAM registration desk or forward a message.

Credit Cards
SIAM is now accepting VISA, MasterCard and American Express for the payment of registration fees and special functions. When you complete the Advance Registration Form, please be certain to indicate the type of credit card, the number and the expiration date.

SIAM Corporate Members
Non-member attendees who are employed by the following institutions are entitled to the SIAM member rate.

Aerospace Corporation
Amoco Production Company
AT&T Bell Laboratories
Bell Communications Research
The Boeing Company
BP America
Cray Research, Inc.
E.I. duPont de Nemours and Company
Eastman Kodak Company
Exxon Research and Engineering Company
General Motors Corporation
GTE Laboratories, Inc.
Hollandse Signaalapparaten B.V.
IBM Corporation
ICASE-NASA Langley Research Center
IMSL, Inc.
MacNeal-Schwendler Corporation
Marathon Oil Company
Martin Marietta Energy Systems
Mathematical Sciences Research Institute
Schlumberger Industries
Supercomputing Research Center, a division of Institute for Defense Analyses
Texaco Inc.
United Technologies Corporation

UPCOMING CONFERENCES

September 25 - 28, 1989
SIAM Conference on Mathematical and Computational Issues in Geophysical Fluid and Solid Mechanics
Stouffer Greenway Plaza Hotel
Houston, TX

September 27 - 29, 1989
SIAM Workshop on Geophysical Inversion
Stouffer Greenway Plaza Hotel
Houston, TX

November 6 - 10, 1989
SIAM Conference on Geometric Design
Sheraton Mission Palms Hotel
Tempe, AZ

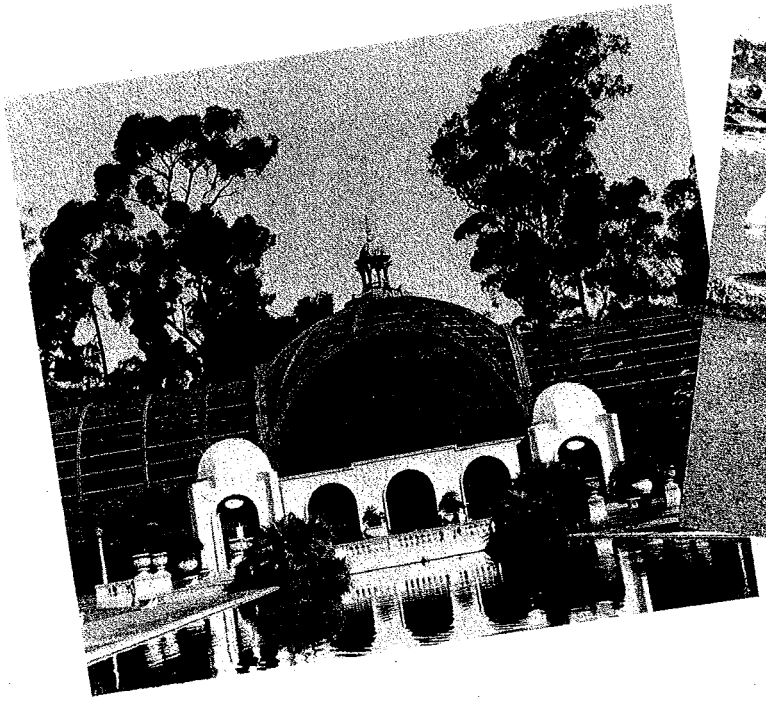
December 11 - 13, 1989
Fourth SIAM Conference on Parallel Processing for Scientific Computing
Hyatt Regency Hotel
Chicago, IL

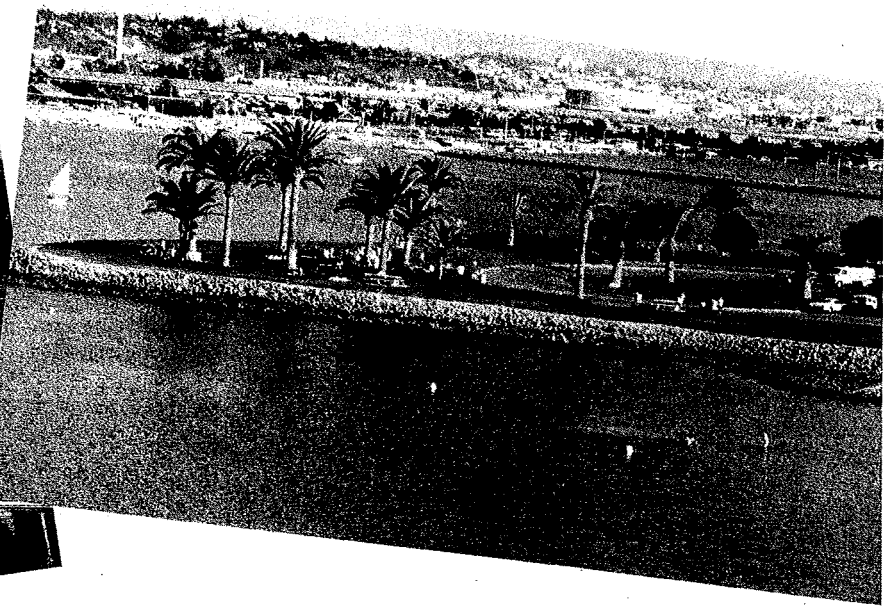
January 22 - 24, 1990
ACM/SIAM Symposium on Discrete Algorithms
Cathedral Hill Hotel
San Francisco, CA

March 5 - 7, 1990
SIAM Conference on Applied Probability in Science and Engineering
Clarion Hotel
New Orleans, LA

May 7 - 10, 1990
SIAM Conference on Applications of Dynamical Systems
Marriott Hotel
Orlando, FL

July 16 - 20, 1990
SIAM Annual Meeting
Hyatt Regency Hotel
Chicago, IL





HOTEL RESERVATION FORM

1989 SIAM Annual Meeting

July 17–21, 1989
Sheraton Harbor Island East
San Diego, California

PLEASE SEND ME A CONFIRMATION NOTICE

Specially discounted rooms are being held for our exclusive use until June 23, 1989. After that date, reservations will depend on availability. Your reservation is not confirmed until acknowledged in writing by the hotel or verified by phone. When making reservations by phone, be certain to identify yourself as an attendee at the 1989 SIAM Annual Meeting. Telephone: 1-619- 291-2900.

Name _____ Phone _____
First Last

Address _____

City _____ State _____ Zip _____

Please reserve [ ] Single ($76) [ ] Double ($91) Arrival Date _____

Arrival Time _____ Check-Out Date _____

Guarantee my room for late arrival (after 6:00 PM) [ ] Yes [ ] No

I choose to pay by:* [ ] AMEX [ ] VISA [ ] MC [ ] Check

Credit Card Number _____

Expiration Date _____ Deposit $_____ (Late Arrivals Only)

Signature _____

If you list your credit card number, please enclose this card in an envelope and mail to: Reservations, The Sheraton Harbor Island East, 1380 Harbor Island Drive, San Diego, CA 92101-1092.

* You only need to list your credit card number if you want to guarantee your room for late arrival.

ADVANCE REGISTRATION FORM

1989 SIAM Annual Meeting

July 17–21, 1989
Sheraton Harbor Island East San Diego, CA 92101

Advance registration form must be received at the SIAM office by July 10, 1989. If paying by check, please make check payable to SIAM.

REGISTRATION FEES:		SIAM Member	Non-Member	Student
Short Course	Advance	$110	$130	$65
	On-Site	$130	$150	$85
Meeting	Advance	$100	$125	$15
	On-Site	$120	$145	$15

Registration Fee:			
Short Course	$_____	$_____	$_____
Meeting	$_____	$_____	$_____
Beer Party $15.00	$_____	$_____	$_____
Harbor Dinner Cruise $30.00	$_____	$_____	$_____
Stragglers Buffet $28.00	$_____	$_____	$_____
Total	$_____	$_____	$_____

Please Print

Name _____
First

_____
Last

Affiliation _____

Department _____

Address _____

City _____ State _____ Zip _____

Telephone Number _____

Local Address in San Diego _____

I wish to pay by [ ] AMEX [ ] VISA [ ] MC [ ] Check

Credit Card Number _____

Expiration Date _____

Signature _____

Detach card and enclose with payment in the envelope provided (domestic mail only), or mail to: SIAM, 117 South 17th Street, 14th Floor, Philadelphia, PA 19103-5052. Telephone: (215) 564-2929.