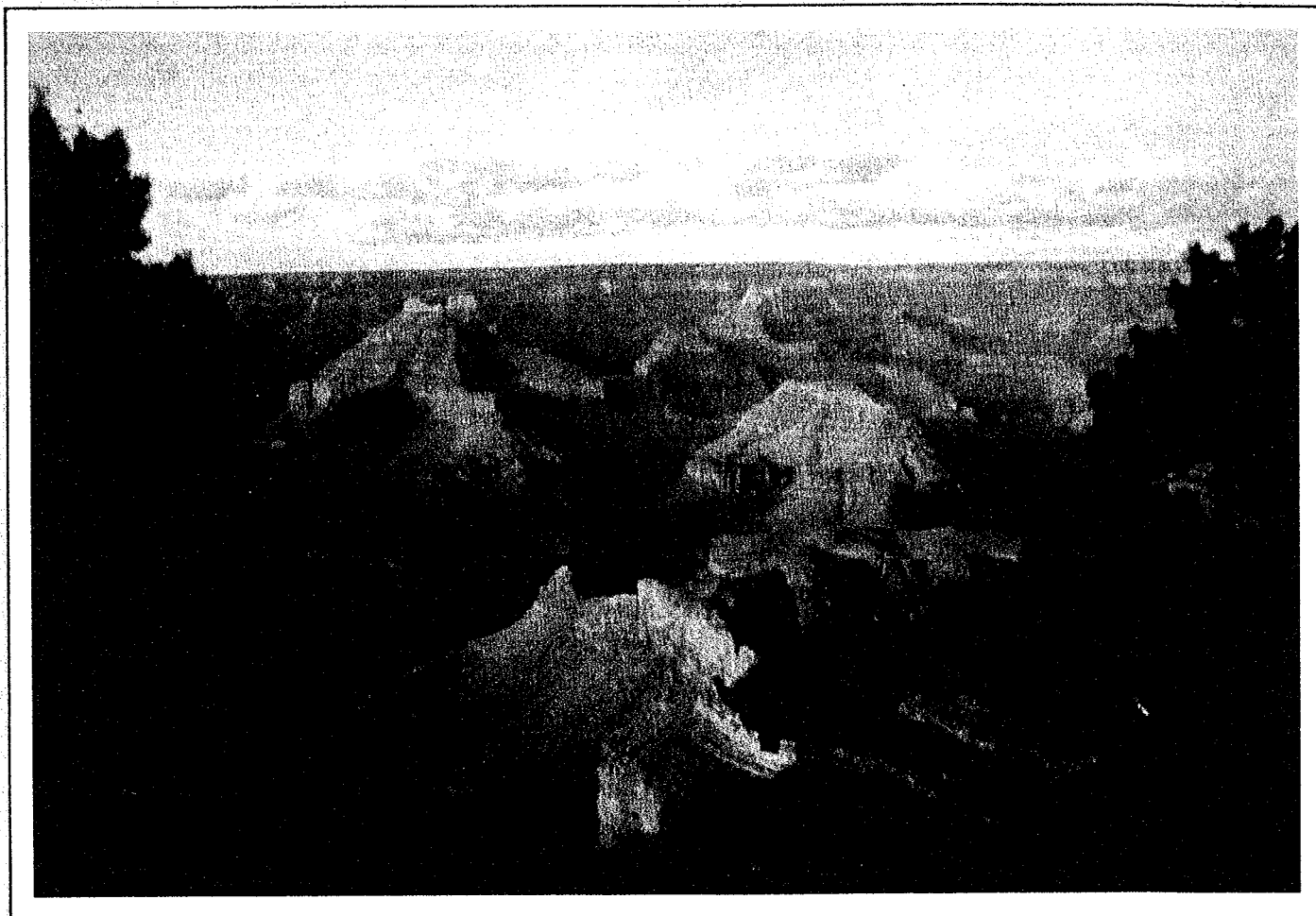


Preliminary Program

SIAM FALL MEETING

October 28 – 30, 1985

**The Memorial Union, Arizona State University
Tempe, Arizona**



MODERN TRENDS IN NUMERICAL FLUID MECHANICS

- Finite Element Methods • Vortex Methods • Spectral Methods • Convergence Proofs
- Applications in Two and Three Dimensions

NUMERICAL SOLUTION OF BIFURCATION PROBLEMS

- Numerical Approximation of Complex Bifurcations • Algorithms and Qualitative Methods
- Bifurcation Applied to Fluid Dynamics • Bifurcation in Crystal Growth

FUNCTIONAL DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS

- Time Delays, Stability, Chaos and Bifurcation • Applications in Medicine, Biology and Population Dynamics
- Numerical Methods for Functional Differential Equations • Stability of Functional Differential Equations

VLSI AND APPLIED MATHEMATICS

- Simulations and Numerical Methods • Programming in Silicon • Algorithms via VLSI

THE NORBERT WIENER PRIZE and THE GEORGE FORSYTHE MEMORIAL LECTURE

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ORGANIZING COMMITTEE

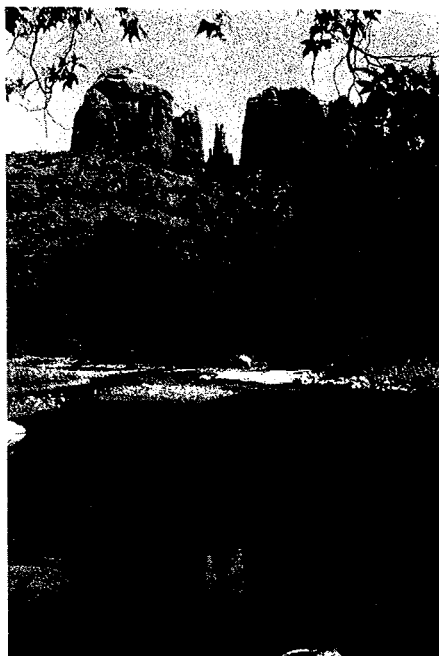
Alan Feldstein (co-chairman),
Arizona State University

Daniel F. Jankowski (co-chairman),
Arizona State University

Hans Mittelman, Arizona State
University

G. Paul Neitzel, Jr., Arizona State
University

Hal L. Smith, Arizona State
University, with the assistance of
Gregory Baker, University
of Arizona



Photographs graciously provided by the Arizona Tourist Bureau and the Phoenix & Valley of the Sun Convention and Visitors Bureau.

MEETING HIGHLIGHTS

Invited Presentations

Monday, October 28, 8:30 AM

Invited Presentation 1 TIME DELAYS, NONLINEARITIES AND BIFURCATIONS IN BIOLOGY AND MEDICINE

Physiological control systems are almost always nonlinear, often contain significant time delays in their feedback pathways, and are capable of displaying a fascinating diversity of behaviors as external inputs are altered, or as parameters within the autonomous system are varied. These behaviors may range from an approach to a stable steady state, to periodic oscillations about a steady state, to irregular or "chaotic" oscillations.

It has been hypothesized that there is a large class of diseases, called dynamic diseases, characterized by the operation of a basically normal physiological control system in a region of parameter space that produces pathological behavior. Thus, pathology may often be associated with bifurcations in system dynamics. This concept, and the understanding that it offers to normal physiological function and associated pathologies, will be discussed with specific examples drawn from a variety of disease states.

Michael C. Mackey
Department of Physiology
McGill University, Montreal, Quebec, Canada

Monday, October 28, 9:15 AM

Invited Presentation 2 FINITE ELEMENT METHODS IN NUMERICAL FLUID MECHANICS

Finite element methods have been applied quite successfully to the numerical solution of equations governing advection-diffusion processes, the incompressible Navier-Stokes equations, compressible flows such as the full potential equations, and compressible Euler and compressible Navier-Stokes equations.

The speaker will present an overview of the current state of development of finite-element methodology in fluid dynamics. Shock capturing with finite element methods and methods that achieve optimal and near-optimal error estimates under various circumstances will be discussed.

Thomas J. R. Hughes
Division of Applied Mechanics
Stanford University, Stanford, CA

Monday, October 28, 2:00 PM

Invited Presentation 3 BIFURCATION, DELAY AND CHAOS

In recent years, several important developments have occurred in the study of bifurcation in delay equations. The focus has been on understanding the limitations that are imposed on the bifurcations, as well as the new bifurcations that occur because the physical system is a delay equation. There also has been some success in the construction of models which can produce chaos. The speaker will provide a survey of these results.

Jack K. Hale
Division of Applied Mathematics
Brown University, Providence, RI

Monday, October 28, 2:45 PM

Invited Presentation 4 SPECTRAL METHODS FOR COMPUTATIONAL FLUID DYNAMICS

Spectral techniques are now being used to obtain information about transitional and turbulent flows, for example—the nature of secondary (transitional) instabilities in wall-bounded and free-shear flows, the structure of large coherent eddies in turbulent flows, and the characterization of such large-scale structures in terms of their vorticity dynamics.

The speaker will review recent applications of spectral methods in fluid dynamics, explain recent extensions of spectral methods to problems involving complicated geometries, and discuss the advantages and disadvantages of spectral element, spectral patching, and spectral embedding methods.

Steven A. Orszag
Applied and Computational
Mathematics
Princeton University, Princeton, NJ

Tuesday, October 29, 8:30 AM

Invited Presentation 5 PROGRAMMING IN SILICON

It has become cost-effective for many scientists to build their own special, high-performance computer systems to meet increasing computational demands. There are several reasons. First, large building-block chips, such as high-speed floating-point chips, high-density memory chips and interconnection chips, are beginning to appear commercially. As a result, various special systems can be fabricated rapidly by combining these chips. Second, advances in semiconductor technology, design automation and silicon foundry have made custom or semi-custom VLSI affordable for efficient implementations of a wide spectrum of special systems. Third, many of the time-consuming inner loops in scientific computations are inherently regular and parallel, and thus are well suited to direct VLSI or hardware implementations.

The speaker will elaborate on these advances and survey recent research and development activities in VLSI that may have profound impacts on scientific computing.

H. T. Kung
Department of Computer Science
Carnegie-Mellon University
Pittsburgh, PA

Tuesday, October 29, 9:15 AM

Invited Presentation 6 NUMERICAL SOLUTION OF BIFURCATION PROBLEMS

Even though the literature on bifurcation problems has been growing at a very rapid pace, there remain many open and interesting problems, especially those involving the numerical solution of static bifurcation problems. The latter concern nonlinear equations with several parameters that typically define the equilibrium configurations of physical systems. Interest centers on the dependence of the solutions on the parameters, and particularly on those values where qualitative changes in the structure of the solution set occur.

Some of the questions, approaches, and challenges involved in numerical solution of static bifurcation problems will be presented. Topics include the characterization and use of suitable augmented forms of the equations, methods for branch switching, the case of multiple bifurcations, symmetry-breaking bifurcations, the influence of discretization errors, and a posteriori error estimates. The close interplay between often deep theoretical results, the demands of applications, and the properties of numerical approaches will be stressed. Applications from structural mechanics will be used for illustration.

Werner C. Rheinboldt
Department of Mathematics and Statistics
University of Pittsburgh, Pittsburgh, PA

Wednesday, October 30, 8:30 AM
Invited Presentation 7
NUMERICAL SIMULATION OF VLSI CIRCUITS

One major problem in the modeling of VLSI circuits is the extension of the concept of steady-state macromodeling of subcircuits to time-dependent macromodeling, to obtain more efficient solution of the modeling equations that provide output current as a function of input voltage. Another is the use of iterative methods for the linear equation-solving loop to increase execution speed and minimize memory requirements. The speaker will discuss current developments in the numerical analysis of these problems.

Donald J. Rose
Department of Computer Science
Duke University, Durham, NC

Wednesday, October 30, 9:15 AM
Invited Presentation 8
COMPLEX BIFURCATIONS APPLIED TO FLUID DYNAMICS

Recently it has been discovered that complex bifurcations emanate from real solution branches of general problems of the form $F(u, \lambda) = 0$ where F is defined by the mapping $B \times R \rightarrow B$. The numerical approximation of these branches has been developed in a way that makes efficient use of just complexifying the arithmetic in the computer. These new techniques have been applied to a variety of fluid dynamics problems. In particular, they enable us to discover new real solution branches and exotic "complex" flows in the Couette-Taylor problem.

Herbert B. Keller
Applied Mathematics
California Institute of Technology
Pasadena, CA

Minisymposia

1. QUALITATIVE APPROACHES TO BIFURCATION IN FLUID MECHANICS
Martin Golubitsky
University of Houston, Houston, TX

2. APPLICATIONS OF DISCRETE MATHEMATICS TO PROBLEMS OF SOCIETY
Sponsored by the SIAM Activity Group on Discrete Mathematics and SIAM Institute for Mathematics and Society
Fred S. Roberts
Rutgers University, New Brunswick, NJ

3. NONLINEARITY, FUNCTIONAL DIFFERENTIAL EQUATIONS, AND POPULATIONS
Lance D. Drager
Texas Tech University, Lubbock, TX

4. NUMERICAL ANALYSIS OF VISCOUS FLOWS WITH FREE SURFACES
J. M. Floryan
The University of Western Ontario
London, Ontario, Canada

5. STABILITY OF FUNCTIONAL DIFFERENTIAL EQUATIONS
Kenneth Cooke
Pomona College, Claremont, CA

6. NUMERICAL METHODS IN SEMICONDUCTOR DEVICE SIMULATION
Brian J. McCartin
United Technologies Research Center
East Hartford, CT

7. A SURVEY OF NUMERICAL METHODS FOR FUNCTIONAL DIFFERENTIAL EQUATIONS
Alan Feldstein
Arizona State University
Tempe, AZ

8. IMPLEMENTATION OF ALGORITHMS IN VLSI
Robert Schreiber
GullTech Research Co., Inc.
Sunnyvale, CA

9. BIFURCATION ANALYSIS APPLIED TO PROBLEMS IN CRYSTAL GROWTH
Robert A. Brown
Massachusetts Institute of Technology
Cambridge, MA

10. APPLICATIONS OF LINEAR ALGEBRA IN DISCRETE AND CONTINUOUS SIMULATION
Sponsored by the SIAM Activity Group on Linear Algebra
Daniel D. Warner
Clemson University, Clemson, SC

11. VORTEX METHODS IN NUMERICAL FLUID MECHANICS
Anthony Leonard
NASA Ames Research Center
Moffett Field, CA

12. NUMBER THEORY APPLICATIONS AND ALGORITHMS
Sponsored by the SIAM Activity Group on Discrete Mathematics
Roger Entringer
University of New Mexico,
Albuquerque, NM
G. J. Simmons
Sandia National Laboratories
Albuquerque, NM

13. HIGH-ORDER METHODS FOR SOLUTION OF FLOW PROBLEMS IN COMPLEX GEOMETRIES

Anthony T. Patera
Massachusetts Institute of Technology
Cambridge, MA

14. BIFURCATION PROBLEMS IN THE LIFE SCIENCES

David J. Wollkind
Washington State University
Pullman, WA

Special Lectures and Prizes

Tuesday, October 29, 2:00 PM
SIAM PAST PRESIDENT'S ADDRESS

Hirsh Cohen
IBM—T. J. Watson Research Center
Yorktown Heights, NY

Tuesday, October 29, 2:45 PM
THE NORBERT WIENER PRIZE

Awarded jointly every five years by SIAM and the AMS for an outstanding contribution to applied mathematics in the highest and broadest sense.

Wednesday, October 30, 2:00 PM
THE GEORGE FORSYTHE MEMORIAL LECTURE

Awarded every other year by SIGNUM
Heinz-Otto Kreiss
Applied Mathematics
California Institute of Technology
Pasadena, CA

Special Functions

Welcoming Reception
Sunday, October 27, 8:00 PM–10:00 PM
Mariposa Hall, Arizona State University
Beer and wine courtesy of SIAM

Patio Party
Monday, October 28, 7:00 PM–10:00 PM
Mariposa Hall, Arizona State University
Beer, wine and hors d'oeuvres. An excellent opportunity to mingle with your colleagues and sample the best of the West.
\$10.00

Desert Cookout
Tuesday, October 29, 6:15 PM–10:30 PM
Buses will leave from the hotels at 6:15 for an evening under the stars. Wander around an authentic old west town; have a drink in an antique bar or gamble in the casino (no card sharps or gunslingers, please!). The group will be taken by horse-drawn haywagons into the desert for a bonfire and cookout, which features a 10-oz. top sirloin steak (chicken for the non-beef eaters) and all the beer, wine or soft drinks you can consume. There will be a full moon on the 29th and the desert should be beautiful! Please join us.

Bring a sweater or light jacket. Although evening temperatures at this time of the year are usually ideal, it can become slightly chilly.
\$25.00 (includes transportation, food, drinks, tax and tip).

PROGRAM AT-A-GLANCE

Sunday, October 27/PM

5:00 PM

Registration Opens

Memorial Union Building
Arizona Room (Second Floor)

8:00 PM

Welcoming Reception

Mariposa Hall (Patio)
Free

10:00 PM

Registration Closes

Monday, October 28/AM

7:30 AM

Registration Opens

8:15 AM/Arizona Room

Opening Remarks

Henry C. Reeves
Vice President for Research
Arizona State University

8:30 AM/Arizona Room

Invited Presentations 1 and 2

Chair: Daniel F. Jankowski
Department of Mechanical and Aerospace
Engineering
Arizona State University

TIME DELAYS, NONLINEARITIES AND BIFURCATIONS IN BIOLOGY AND MEDICINE

Michael C. Mackey
Department of Physiology
McGill University

FINITE ELEMENT METHODS IN NUMERICAL FLUID MECHANICS

Thomas J. R. Hughes
Division of Applied Mechanics
Stanford University

10:00 AM/Arizona Reception Room

Coffee

10:30 AM/CONCURRENT SESSIONS

Minisymposium 1/Pinal Room

Qualitative Approaches to Bifurcation in Fluid Mechanics

Chair: Martin Golubitsky
Department of Mathematics
University of Houston

Minisymposium 2/Arizona Room

Applications of Discrete Mathematics to Problems of Society

Chair: Fred S. Roberts
Department of Mathematics
Rutgers University

Minisymposium 3/Mohave Room

Nonlinearity, Functional Differential Equations and Populations

Chair: Lance D. Drager
Department of Mathematics
Texas Tech University

Minisymposium 4/Pima Room

Numerical Analysis of Viscous Flows With Free Surfaces

Chair: J. M. Floryan
Faculty of Engineering Science
The University of Western Ontario

Contributed Papers 1/Cochise Room

Numerical Solutions of Partial Differential Equations

Chair: Christian Ringhofer
Department of Mathematics
Arizona State University

Monday, October 28/PM

12:30 PM/Lunch

2:00 PM/Arizona Room

Invited Presentations 3 and 4

Chair: Alan Feldstein
Department of Mathematics
Arizona State University

BIFURCATION, DELAY AND CHAOS

Jack K. Hale
Division of Applied Mathematics
Brown University

SPECTRAL METHODS FOR COMPUTATIONAL FLUID DYNAMICS

Steven A. Orszag
Applied and Computational Mathematics
Princeton University

3:30 PM/Arizona Reception Room

Coffee

4:00 PM/CONCURRENT SESSIONS

Minisymposium 5/Pinal Room

Stability of Functional Differential Equations

Chair: Kenneth L. Cooke
Department of Mathematics
Pomona College

Minisymposium 6/Arizona Room

Numerical Methods in Semiconductor Device Simulation

Chair: Brian J. McCartin
United Technologies Research Center
Contributed Papers 2/Pima Room
Numerical Fluid Mechanics I
Chair: William S. Saric
Department of Mechanical and Aerospace
Engineering
Arizona State University

Contributed Papers 3/Navajo Room

Stochastic and Discrete Systems

Chair: Al Erisman
Boeing Computer Services Co.

Contributed Papers 4/Mohave Room

Bifurcation Problems in Fluid Mechanics

Chair: Gregory Baker
Department of Mathematics
University of Arizona

7:00 PM

Patio Party

Mariposa Hall, Arizona State University
Beer, wine and hor's d'oeuvres

Tuesday, October 29/AM

8:30 AM/Arizona Room

Invited Presentations 5 and 6

Chair: C. W. Gear
Department of Computer Science
University of Illinois

PROGRAMMING IN SILICON

H. T. Kung
Department of Computer Science
Carnegie-Mellon University

NUMERICAL SOLUTION OF BIFURCATION PROBLEMS

Werner C. Rheinboldt
Department of Mathematics and Statistics
University of Pittsburgh

10:00 AM/Arizona Reception Room

Coffee

10:30 AM/CONCURRENT SESSIONS

Minisymposium 7/Pima Room

A Survey of Numerical Methods for Functional Differential Equations

Chair: Alan Feldstein
Department of Mathematics
Arizona State University

Minisymposium 8/Cochise Room

Implementation of Algorithms In VLSI

Chair: Robert Schreiber
GuilTech Research Co., Inc.

Contributed Papers 5/Mohave Room

Numerical Fluid Mechanics II

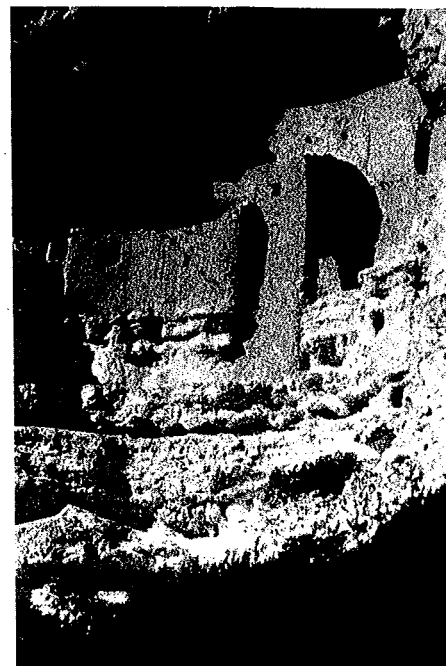
Chair: K. Y. Fung
Department of Aerospace and Mechanical
Engineering
University of Arizona

Contributed Papers 6/Pinal Room

Numerical Solution of Bifurcation Problems

Chair: George W. Reddien, Jr.
Department of Mathematics
Southern Methodist University

POSTER SESSION 1/Coconino Room



Tuesday, October 29/PM

12:30 PM/Lunch

2:00 PM/Arizona Room

SIAM Past President's Address

Hirsh Cohen

IBM—T. J. Watson Research Center

2:45 PM/Arizona Room

The Norbert Wiener Prize

Awarded jointly by SIAM and the AMS every five years for an outstanding contribution to applied mathematics in the highest and broadest sense.

3:00 PM/Arizona Reception Room

Coffee

3:30 PM/CONCURRENT SESSIONS

Minisymposium 9/Pima Room

Bifurcation Analysis Applied to Problems in Crystal Growth

Chair: Robert A. Brown

Department of Chemical Engineering
Massachusetts Institute of Technology

Minisymposium 10/Mohave Room

Applications of Linear Algebra in Discrete and Continuous Simulation

Chair: Daniel D. Warner

Department of Mathematics
Clemson University

Minisymposium 11/Yuma Room

Vortex Methods in Numerical Fluid Mechanics

Chair: Anthony Leonard

NASA Ames Research Center

Contributed Papers 7/Cochise Room

Finite Element Methods

Chair: William B. Bickford

Department of Mechanical and Aerospace Engineering
Arizona State University

Contributed Papers 8/Arizona Room

Systems Theory and Applied Mathematics

Chair: Robert S. Stepleman

Exxon Research and Engineering Company

6:15 PM

Desert Cookout

Assemble at hotels for bus pick-up

Wednesday, October 30/AM

8:30 AM/Arizona Room

Invited Presentations 7 and 8

Chair: Hans D. Mittelmann

Department of Mathematics

Arizona State University

NUMERICAL SIMULATION OF VLSI CIRCUITS

Donald J. Rose

Department of Computer Science

Duke University

COMPLEX BIFURCATIONS APPLIED TO FLUID DYNAMICS

Herbert B. Keller

Applied Mathematics

California Institute of Technology

10:00 AM/Arizona Reception Room

Coffee

10:30 AM/CONCURRENT SESSIONS

Minisymposium 12/Pinal Room

Number Theory Applications and Algorithms

Chairs: Roger Entringer

Department of Mathematics and Statistics

University of New Mexico

and

G. J. Simmons

Sandia National Laboratories

Minisymposium 13/Pima Room

High Order Methods for Solution of Flow

Problems in Complex Geometries

Chair: Anthony T. Patera

Department of Mechanical Engineering

Massachusetts Institute of Technology

Contributed Papers 9/Mohave Room

Numerical Analysis and Integral Equations

Chair: Richard K. Miller

Department of Mathematics

Iowa State University

Contributed Papers 10/Cochise Room

Bifurcation

Chair: David Fox

Air Force Office of Scientific Research

Bolling Air Force Base

POSTER SESSION 2/Coconino Room

Repeat of Poster Session 1

Wednesday, October 30/PM

12:30 PM/Lunch

2:00 PM/Arizona Room

The George Forsythe Memorial Lecture

NUMERICAL METHODS TO SOLVE LINEAR AND NONLINEAR SINGULAR PERTURBATION PROBLEMS

Awarded every other year by SIGNUM

Heinz-Otto Kreiss

Applied Mathematics

California Institute of Technology

3:00 PM/Arizona Reception Room

Coffee

3:30 PM/CONCURRENT SESSIONS

Minisymposium 14/Cochise Room

Bifurcation Problems in the Life Sciences

Chair: David J. Wollkind

Department of Pure and Applied Mathematics

Washington State University

Contributed Papers 11/Pima Room

Functional and Ordinary Differential Equations

Chair: Linda Kaufman

AT&T Bell Laboratories

Contributed Papers 12/Arizona Room

VLSI

Chair: Robert Grafton

Office of Naval Research

Contributed Papers 13/Mohave Room

Fluid Mechanics

Chair: Helen Reed

Department of Mechanical and Aerospace

Engineering

Arizona State University

Contributed Papers 14/Navajo Room

Mathematical Problems in the Physical Sciences

Chair: Alan P. Wang

Department of Mathematics

Arizona State University

6:00 PM/Meeting Adjourns



MINISYMPOSIA

Monday, October 28/10:30 AM
Minisymposium 1/Pinal Room

QUALITATIVE APPROACHES TO BIFURCATION IN FLUID MECHANICS

Recent years have seen great progress made in the qualitative description of dynamical systems. Part of this progress has been based on unfolding theory which allows quasi-global information to be obtained by local methods; part has been based on analyses involving symmetries and group theory. In this minisymposium several applications of these ideas to specific problems in fluid mechanics will be discussed.

CHAIRMAN AND ORGANIZER

Martin Golubitsky
Department of Mathematics
University of Houston
Houston, TX

Successive Bifurcation and the Origin of Double Stars

Norman R. Lebovitz
Department of Mathematics
The University of Chicago
Chicago, IL

Stability and Bifurcation in Flows of Two Fluids

Yuriko and Michael Renardy
Mathematics Research Center
University of Wisconsin, Madison
Madison, WI

Daniel D. Joseph
Department of Aerospace Engineering
University of Minnesota
Minneapolis, MN

Effects of Symmetry on Hopf Bifurcation (To be presented by the chairman)

Multiparameter Bifurcation and Symmetry in Taylor-Couette Flow

William F. Langford
Department of Mathematics and Statistics
University of Guelph
Guelph, Ontario, Canada
Martin Golubitsky
Department of Mathematics
University of Houston
Houston, TX

Monday, October 28/10:30 AM
Minisymposium 2/Arizona Room

APPLICATIONS OF DISCRETE MATHEMATICS TO PROBLEMS OF SOCIETY

Sponsored by the SIAM Activity Group on Discrete Mathematics and SIAM Institute for Mathematics and Society

Discrete mathematics is finding a wide variety of applications to societal problems. This session will survey both mathematical methodologies (game theory, graph theory, mathematical programming) and applications (arms control, energy use, location of environmentally sensitive facilities).

CHAIRMAN AND ORGANIZER

Fred S. Roberts
Department of Mathematics
Rutgers University
New Brunswick, NJ

Game Theory as a Tool to Increase Cooperation and Equitable Allocation

William F. Lucas
Department of Mathematics
Claremont Graduate School
Claremont, CA

Efficiency Measures for Multi-input Situations: DEA Models

Robert Thrall
Decision and Management Sciences
National Science Foundation
Washington, DC
and
Department of Mathematical Sciences
Rice University
Houston, TX

Structural Analysis of Correlation and Flows for Energy Modeling

Harvey Greenberg
Department of Mathematics
University of Colorado at Denver
Denver, CO

Monday, October 28/10:30 AM
Minisymposium 3/Mohave Room

NONLINEARITY, FUNCTIONAL DIFFERENTIAL EQUATIONS, AND POPULATIONS

The theme of this minisymposium is the qualitative analysis of nonlinear systems related to population dynamics. The talks will span a spectrum from mathematical results to the analysis of real world data. The speakers will discuss mathematical results on general classes of functional differential equations arising in population dynamics and other problems, the analysis of specific functional differential equation models for population dynamics, and chaos in populations and the analysis of empirical population data. Open problems and directions for research will be discussed.

CHAIRMAN AND ORGANIZER

Lance D. Drager
Department of Mathematics
Texas Tech University
Lubbock, TX

Functional Differential Equations and Structured Population Growth

J. M. Cushing
Department of Mathematics
University of Arizona
Tucson, AZ

Nonlinear Dynamics in Ecology and Epidemiology

William M. Schaffer
Department of Ecology and Evolutionary Biology
and Program in Applied Mathematics
The University of Arizona
Tucson, AZ

Some Existence Questions for Nonlinear Functional Differential Equations

Lance D. Drager
Department of Mathematics
Texas Tech University
Lubbock, TX
William Layton
School of Mathematics
Georgia Institute of Technology
Atlanta, GA

Nonlinear Functional Differential Equations, Non-Resonance, and the Behavior of Solutions

Lance D. Drager
Department of Mathematics
Texas Tech University
Lubbock, TX
William Layton
School of Mathematics
Georgia Institute of Technology
Atlanta, GA

Monday, October 28/10:30 AM
Minisymposium 4/Pima Room

NUMERICAL ANALYSIS OF VISCOUS FLOWS WITH FREE SURFACES

One of the challenging problems in fluid mechanics is the calculation of the location of the free surface of a moving viscous fluid. Since both the governing equations and the boundary conditions are nonlinear, and the solution domain is not known a priori, these problems can rarely be solved analytically, even for the simplest cases. When the free surface deforms only slightly, an asymptotic solution may be used to decouple the surface deformation from the flow field. In all the remaining cases a direct numerical solution to the full free-boundary problem is required. The participants of the minisymposium will describe different algorithms developed to deal with such problems.

CHAIRMAN AND ORGANIZER

J. M. Floryan
Faculty of Engineering Science
The University of Western Ontario
London, Ontario, Canada

Coordinate Transformation Method for Viscous Flows with Free Surfaces

H. Rasmussen
Department of Applied Mathematics
J. M. Floryan
Faculty of Engineering Science
The University of Western Ontario
London, Ontario, Canada

Finite-Difference/Orthogonal-Mapping Technique for Viscous Free-Boundary Problems

G. Ryskin
Department of Chemical Engineering
Northwestern University
Evanston, IL
L. G. Leal
Department of Chemical Engineering
California Institute of Technology
Pasadena, CA

Non-Isothermal, Viscous Free Surface Flows

R. L. Sani
Department of Chemical Engineering
and CIRES
University of Colorado
Boulder, CO
M. S. Engelman
Department of Mathematics
Illinois Institute of Technology
Chicago, IL

Theory of Viscous Free Surface Flows in Coating Operations

Kostas N. Christodoulou and L. E. Scriven
Department of Chemical Engineering and Materials Science and the Supercomputer Institute
University of Minnesota
Minneapolis, MN

Monday, October 28/4:00 PM
Minisymposium 5/Pinal Room

STABILITY OF FUNCTIONAL DIFFERENTIAL EQUATIONS

This minisymposium will provide a survey of recent advances in the stability theory of ordinary and partial delay-differential equations and functional differential equations. Such equations are continuing to find significant applications in a variety of areas. Liapunov, spectral and geometric methods will be

described for autonomous and time-dependent linear as well as nonlinear systems of such equations.

CHAIRMAN AND ORGANIZER

Kenneth Cooke
Department of Mathematics
Pomona College
Claremont, CA

Stability Theory for Differential Delay Equations with Negative Feedback

George Sell
Institute for Mathematics and Its Applications
University of Minnesota
Minneapolis, MN

A Bifurcation Gap for a Singularly Perturbed Differential-Delay Equation

John Mallet-Paret
Division of Applied Mathematics
Brown University
Providence, RI

Roger D. Nussbaum
Department of Mathematics
Rutgers University
New Brunswick, NJ

On Stability of Limit Cycles of Feedback Systems Which Contain a Hysteresis Nonlinearity

Richard K. Miller and Gary S. Krenz
Department of Mathematics
Iowa State University
Ames, IA

Anthony N. Michel
Department of Electrical Engineering
University of Notre Dame
Notre Dame, IN

Recent Advances in Liapunov's Direct Method for Functional Differential Equations

T. A. Burton
Department of Mathematics
Southern Illinois University at Carbondale
Carbondale, IL

Shunian Zhang
Department of Mathematics
Southern Illinois University at Carbondale
Carbondale, IL
(on leave from Anhui University at Hufei, People's Republic of China)

Stability Theory of Linear Non-Autonomous and Partial Functional Differential Equations

Stavros Busenberg
Department of Mathematics
Harvey Mudd College
Claremont, CA

Monday, October 28/4:00 PM
Minisymposium 6/Arizona Room

NUMERICAL METHODS IN SEMICONDUCTOR DEVICE SIMULATION

The numerical simulation of microelectronic devices has received increasing attention over the past decade. Research efforts have ranged from purely mathematical questions of existence and uniqueness of solutions to practical issues of computation. This minisymposium features presentations by researchers from government, academia, and industry on topics spanning the full gamut of current activities in this area.

CHAIRMAN AND ORGANIZER

Brian J. McCartin
United Technologies Research Center
East Hartford, CT

Monte-Carlo Simulation of Electron Devices with Small Dimensions

Harry Berkowitz
U.S. Electronics Technology and Device Laboratory
Ft. Monmouth, NJ

On the Choice of Algorithms for Transient Semiconductor Modeling

J. P. Kreskovsky and H. L. Grubin
Solid State Device Research
Scientific Research Associates, Inc.
Glastonbury, CT

Implications of an Asymptotic Analysis on the Numerical Solution of the Transient Fundamental Semiconductor Device Equations

Christian Ringhofer
Department of Mathematics
Arizona State University
Tempe, AZ

A Proof of Convergence of Gummel's Algorithm for Realistic Device Geometries

Tom Kerkhoven
Research Center for Scientific Computation
Yale University
New Haven, CT

A Model-Trust-Region Algorithm for the Solution of the Discretized Semiconductor Device Equations

Brian J. McCartin, R. H. Hobbs, and R. E. LaBarre
United Technologies Research Center
East Hartford, CT

Theory and Computation for Transient Semiconductor Problems

Thomas I. Seidman
Department of Mathematics and Computer Science
University of Maryland Baltimore County
Catonsville, MD

Tuesday, October 29/10:30 AM
Minisymposium 7/Pima Room

A SURVEY OF NUMERICAL METHODS FOR FUNCTIONAL DIFFERENTIAL EQUATIONS

Numerical methods for delay differential equations must account for the discontinuities in various derivatives of the solution. Typically, these are induced by the incompatibility of the initial function. The first speaker addresses the propagation of these jump points and presents a tree structure for tracking them plus an algorithm (the Restart Method) for integrating delay equations. The Restart Method applies even when the delays are state-dependent, and it locates all possible jumps. The second speaker discusses an extrapolated midpoint rule for delay equations. This method automatically corrects for the effect of the jumps when the delays are constant. The third speaker discusses a more general type of delay problem, one with discontinuities induced by incompatible initial conditions as well as from certain discontinuous data. Neutral differential equations have time delays in both the solution and its derivative. Because of this derivative delay, neutral equations are more complicated to solve than are delay equations. The fourth speaker presents numerical methods for neutral equations in certain smooth situations. All four speakers include algorithms and numerical results.

CHAIRMAN AND ORGANIZER

Alan Feldstein
Department of Mathematics
Arizona State University
Tempe, AZ

The Restart Method for State-Dependent Delay Differential Equations

(To be presented by the chairman)

Extrapolated Midpoint Rule for Delay Equations

Maarten de Gee
Department of Mathematics
Agricultural University
Wageningen, The Netherlands

The Numerical Integration of Delay Differential Equations with Multi-Valued Hysteretic Behavior

Lucio Tavernini
Division of Mathematics, Computer Science, and Systems Design
University of Texas, San Antonio
San Antonio, TX

The Numerical Solution of Neutral Functional Differential Equations

Zdzislaw Jackiewicz
Department of Mathematical Sciences
University of Arkansas
Fayetteville, AR

Tuesday, October 29/10:30 AM
Minisymposium 8/Cochise Room

IMPLEMENTATION OF ALGORITHMS IN VLSI

Many of the applications of mathematics have come to rely heavily on very high speed numerical computation to improve performance. Today's news in this field is dominated by VLSI designs, which consist of many identical, parallel devices. These VLSI implementations of algorithms are largely special purpose. During the past 5 years, substantial literature on the implementation of important algorithms for matrix computation has grown. In many cases, new algorithm ideas have been necessary. Several developments of this kind will be discussed by Luk and Schreiber. Current VLSI architectures actually exceed the realistic capabilities of single chip machines. There has therefore been much interest in wafer scale design. New problems, of machine architecture, reliability, reconfigurability and program development, must be addressed. Snyder will discuss topics in this area. Some substantial real systems that implement algorithms in VLSI are now being constructed. Signal processing applications are especially suitable. Schlansker will describe some present progress and future possibilities for genuine VLSI implementations.

CHAIRMAN AND ORGANIZER

Robert Schreiber
GuilTech Research Co., Inc.
Sunnyvale, CA

Parallel Jacobi-Like Methods for Real Time Signal Processing

Franklin Luk
School of Electrical Engineering
Cornell University
Ithaca, NY

Direct VLSI Implementation of Algorithms: The Prospects and the Problems

Larry Snyder
Department of Computer Science
University of Washington
Seattle, WA

Minisymposia

Signal Processing Applications of Systolic Array Technology

Michael Schlansker
ESL, Inc.
Sunnyvale, CA

SVD, Least Squares and VLSI Architectures (To be presented by the chairman)

Tuesday, October 29/3:30 PM
Minisymposium 9/Pima Room

BIFURCATION ANALYSIS APPLIED TO PROBLEMS IN CRYSTAL GROWTH

Convection in the melt, heat and mass transfer, and melt/solid interface morphology during the growth of metal and semiconductor crystals by controlled solidification exhibit transitions between steady and time-dependent patterns, as observed in much simpler systems. Accurate prediction of these states is essential for quantitative modeling of crystal growth systems. Progress is being made by combining numerical methods with computer-assisted bifurcation analysis. This minisymposium focuses on recent advances in analysis of macroscopic convection in the solidification of dilute and binary alloys and prediction of the evolution of microscopic melt/solid interface morphology during directional growth.

CHAIRMAN AND ORGANIZER

Robert A. Brown
Department of Chemical Engineering
Massachusetts Institute of Technology
Cambridge, MA

Transitions in Microscopic Melt/Solid Interface Morphologies During Directional Solidification

Robert A. Brown and M. J. Bennett
Department of Chemical Engineering
Massachusetts Institute of Technology
Cambridge, MA

L. H. Ungar
Department of Chemical Engineering
University of Pennsylvania
Philadelphia, PA

Thermosolutal Convection During Directional Solidification

G. B. McFadden and R. G. Rehm
Center for Applied Mathematics

S. R. Coriell
Center for Materials Science
National Bureau of Standards
Gaithersburg, MD

Direct Numerical Simulation of Bulk Flow in Czochralski Crystal Growth

Anthony T. Patera and Andrew V. Tangborn
Department of Mechanical Engineering
Massachusetts Institute of Technology
Cambridge, MA

Tuesday, October 29/3:30 PM
Minisymposium 10/Mohave Room

APPLICATIONS OF LINEAR ALGEBRA IN DISCRETE AND CONTINUOUS SIMULATION

Sponsored by the SIAM Activity Group on Linear Algebra

Traditionally linear systems, both discrete and continuous, have been analyzed with tools from transform theory. When the systems become more complex and nonlinear, the analytic tools are replaced by direct simulation. However, the traditional analytic tools provide little direct assistance in the development of the computer

simulation. Recently, linear systems have been increasingly re-examined with the tools of linear algebra, particularly matrix theory. These tools tend to provide more detailed information concerning the structure and other properties of the system, and this additional information can frequently be exploited in the design of computer simulations. This minisymposium will address some of the interactions.

CHAIRMAN AND ORGANIZER

Daniel D. Warner
Department of Mathematical Sciences
Clemson University
Clemson, SC

Matrix-Free Methods for Stiff Systems of ODE's

Peter N. Brown
Mathematics Department
University of Houston
University Park
Houston, TX

Alan C. Hindmarsh
Mathematics and Statistics Division
Lawrence Livermore National Laboratory
Livermore, CA

Eigenvalue Perturbations of Symmetric Matrices for Hierarchical Systems

Charles R. Johnson and Daniel D. Warner
Department of Mathematical Sciences
Clemson University
Clemson, SC

Nonlinear Matrix Equations Related to Random Walks on Semi-Infinite Lattices

Marcel F. Neuts
Department of Systems and Industrial Engineering
University of Arizona
Tucson, AZ

A Decomposition Algorithm for Solving Linear Equations Arising in Hierarchical Systems

Barry W. Peyton and Daniel D. Warner
Department of Mathematical Sciences
Clemson University
Clemson, SC

Tuesday, October 29/3:30 PM
Minisymposium 11/Yuma Room

VORTEX METHODS IN NUMERICAL FLUID MECHANICS

Many incompressible flows at high Reynolds numbers are characterized by regions of concentrated vorticity imbedded in an irrotational fluid. By the theorems of Helmholtz and Kelvin we know that the inviscid motion of the vorticity in these regions is given by the local fluid velocity, which in turn is determined kinematically from the vorticity field. Vortex methods take advantage of these facts by representing the vorticity field as parcels of vorticity which induce motion on each other. Recent progress in the development and application of vortex methods has been impressive. This minisymposium will concentrate on improvements and new applications of contour dynamics methods, which allow the study of the stability and nonlinear dynamics of idealized inviscid flows in two dimensions with high precision.

CHAIRMAN AND ORGANIZER

Anthony Leonard
NASA Ames Research Center
Moffett Field, CA

Vortex Methods in Stratified Flow

Gregory Baker
Department of Mathematics
University of Arizona
Tucson, AZ

A Contour Dynamics Approach to Some Problems in Fluid and Plasma Dynamics

Edward A. Overman II
Institute for Computational Mathematics and Applications
Department of Mathematics and Statistics
University of Pittsburgh
Pittsburgh, PA

A Contour Dynamics Algorithm for Axisymmetric Flow

Karim Shariff and Joel Ferziger
Department of Mechanical Engineering
Stanford University
Stanford, CA

Anthony Leonard
NASA Ames Research Center
Moffett Field, CA

Wednesday, October 30/10:30 AM
Minisymposium 12/Pinal Room

NUMBER THEORY APPLICATIONS AND ALGORITHMS

Sponsored by the SIAM Activity Group on Discrete Mathematics

This minisymposium consists of three presentations. The first will cover a broad range of applications from fast transform and convolution algorithms through concert hall acoustics to deterministic chaos. The remaining two will concentrate on number theoretic aspects of computing and computer design. In particular, novel computer arithmetic and its implementation in VLSI circuits will be discussed.

CHAIRMEN AND ORGANIZERS

Roger Entringer
Department of Mathematics
University of New Mexico
Albuquerque, NM

G. J. Simmons
Sandia National Laboratories
Albuquerque, NM

Number Theory in Science and Communication

Manfred R. Schroeder
Universitat Gottingen
West Germany
and
AT&T Bell Laboratories
Murray Hill, NJ

A Binary Numeric Representation and Arithmetic Founded on Continued Fraction Expansion and the Euclidean Algorithm

David W. Matula
Department of Computer Science
Southern Methodist University
Dallas, TX

Modular Arithmetic, p-adic Analysis and VLSI Circuits

George B. Purdy
Department of Mathematics
Texas A&M University
College Station, TX

Wednesday, October 30/10:30 AM
Minisymposium 13/Pima Room

HIGH-ORDER METHODS FOR SOLUTION OF FLOW PROBLEMS IN COMPLEX GEOMETRIES

Global high-order (spectral) methods have proven very successful in the numerical simulation of incompressible moderate Reynolds number flows. These high-order methods offer good resolution properties near walls, minimal numerical dispersion and diffusion, and high accuracy for few degrees-of-freedom. However, the implementation, accuracy, and efficiency of spectral techniques is strongly dependent on geometric simplicity, and the methods have therefore only been applied to problems in relatively simple flow domains (channels, pipes, spheres). In this minisymposium, we review various approaches for extending the success of spectral methods to more complex configurations, and give several examples of transition and turbulence flow simulation in complicated geometry using high-order finite techniques. Spectral element (high-order finite element), multi-domain spectral (spectral domain decomposition with patching), and high-order finite-difference techniques are discussed.

CHAIRMAN AND ORGANIZER

Anthony T. Patera
Department of Mechanical Engineering
Massachusetts Institute of Technology
Cambridge, MA

An Isoparametric Spectral Element Method for Solution of the Incompressible Navier-Stokes Equations in Complex Geometry
(To be presented by the chairman)

Spectral and High-Order Finite Difference Methods for Three-Dimensional Complex Geometries

Yves F. Morchoisne
Theoretical Aerodynamics Division 2
ONERA
Chatillon, Cedex, France

Pseudospectral Methods with Finite Element Preconditioning

Michel O. Deville
Unite de Mecanique Appliquee
Universite Catholique de Louvain
Louvain-La-Nueve, Belgium

Wednesday, October 30/3:30 PM
Minisymposium 14/Cochise Room

BIFURCATION PROBLEMS IN THE LIFE SCIENCES

The branching and stability of solutions of nonlinear equations represents an important methodology by which dynamical systems can be analyzed. Originally such methods of bifurcation were developed predominantly to investigate engineering and physical science phenomena. Many modern advances in bifurcation theory, however, have arisen through the application of these methods and their adaptations to problems in the life sciences. This minisymposium focuses on recent bifurcation problems in ecology, developmental biology, population genetics, optimal harvesting, and resource management. The five speakers will demonstrate how analytical and numerical techniques of tuning the bifurcation parameter for their particular ordinary differential and finite difference

equation models have yielded results in good qualitative and quantitative agreement with various relevant data sets.

CHAIRMAN AND ORGANIZER

David J. Wollkind
Department of Pure and Applied Mathematics
Washington State University
Pullman, WA

A Bifurcation Analysis Relevant to Starfish Predation of Coral Reef Communities

Peter L. Antonelli
Department of Mathematics
University of Alberta
Edmonton, Alberta, Canada

Bifurcations in Capacitively-Coupled Oscillators

Hans G. Othmer
Department of Mathematics
University of Utah
Salt Lake City, UT

Bifurcation Problems in Population Genetics

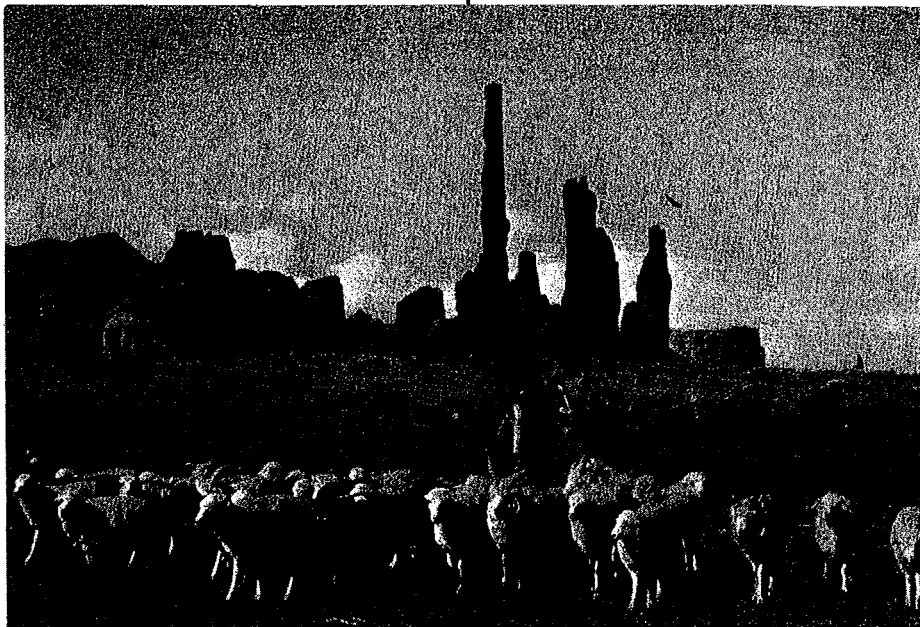
Alan Hastings
Department of Mathematics and Division of Environmental Studies
University of California, Davis
Davis, CA

The Diagnostic Use of Models in Empirical Science: The Population Cycling of Dungeness Crab

Robert McKelvey
Department of Mathematical Sciences
University of Montana
Missoula, MT

Bifurcation Theory and the Paradox of Enrichment

(To be presented by the chairman)



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UPCOMING SIAM CONFERENCES

November 18-21, 1985

SIAM Conference on Parallel Processing for Scientific Computing
Omni Hotel
Norfolk, Virginia

May 14-16, 1986

Third SIAM Conference on Discrete Mathematics
Clemson University
Clemson, South Carolina

July 21-25, 1986

SIAM 1986 National Meeting
Boston Park Plaza Hotel
Boston, MA

CONTRIBUTED PAPERS

Monday, October 28/10:30 AM
Contributed Papers 1/Cochise Room

NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Chairman: Christian Ringhofer, Department of Mathematics, Arizona State University, Tempe, AZ

A Package for Solving Coupled Systems of Time Varying Partial Differential Equations in Two Dimensions

Linda Kaufman and N. L. Schryer, AT&T Bell Laboratories, Murray Hill, NJ

Absorbing Boundary Conditions and One-way Wave Equations

Lloyd N. Trefethen, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA

An Adaptive Viscous Splitting Algorithm

William G. Szymczak, Applied Mathematics Branch, Naval Surface Weapons Center, White Oak, Silver Spring, MD; and Ivo Babuska, Institute for Physical Science and Technology, University of Maryland, College Park, MD

On the Folding of Numerical Grids

José Castillo, Department of Mathematics and Statistics, University of New Mexico, Albuquerque, NM; Patrick Roache and Stanly Steinberg, Ecodynamics Research Associates Inc., Albuquerque, NM

A Multidomain Spectral Method for Hyperbolic Equations

David A. Kopriva, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA

A Class of High Order, Numerical Methods for Parabolic Problems

Stephen E. Stuckwisch, Department of Mathematics, Auburn University, Auburn University, AL

Sinc-Galerkin Method for Singular Elliptic Problems

John Lund and Kenneth L. Bowers, Department of Mathematical Sciences, Montana State University, Bozeman, MT

Analysis Unifying the High Order Numerical Approximations Used in PDE's

Peter Hoffman, Department of Mathematics, University of Colorado, Denver, CO

Application of High-Accuracy Arithmetic (ACRITH) to the Conjugate-Gradient Solution of a Boundary-Value Problem

William W. Bower and Galen R. Peters, McDonnell Douglas Corporation, St. Louis, MO

Monday, October 28/4:00 PM
Contributed Papers 2/Pima Room

NUMERICAL FLUID MECHANICS I

Chairman: William S. Saric, Department of Mechanical and Aerospace Engineering, Arizona State University, Tempe, AZ

Modeling of Three-Dimensional Natural Convection with a Time-Split Finite Element Technique

Darrell W. Pepper, E. I. du Pont de Nemours, Scientific Computations Division, Savannah River Laboratory, Aiken, SC

Unsteady Heat and Momentum Transport From A Cylinder

Cyrus Aidun and Sung P. Lin, Department of Mechanical and Industrial Engineering, Clarkson University, Potsdam, NY

Solution of the Eigenvalue Problems of Hydrodynamic Stability by a Chebyshev Spectral Method

Abdelfattah Zebib, Department of Mechanical and Aerospace Engineering, Rutgers University, New Brunswick, NJ

Pressure Boundary Conditions For Solving The Navier Stokes Equations for Incompressible Flow

Hwar C. Ku and Thomas D. Taylor, Applied Physics Lab, The Johns Hopkins University, Laurel, MD

Minimizing the Steady State Truncation Error

Sal A. Leone and James K. Hodge, Department of Aeronautics and Astronautics, Air Force Institute of Technology, Wright-Patterson AFB, OH

Numerical Solutions of the Laminar Navier-Stokes Equations In Semi-Infinite Rectangular Domains

A. A. Hassan and J. S. Dekruif, Department of Mechanical and Aerospace Engineering, Arizona State University, Tempe, AZ

Implicit Numerical Solution of Navier-Stokes Equations for Axi-Symmetric Laminar Flow

N. S. Madhavan and V. Swaminathan, Applied Mathematics Division, Vikram Sarabhai Space Centre, Indian Space Research Organization, Trivandrum, India

Experience with Pseudospectral Solutions to the Advection-Diffusion Equation on a Rectangular Grid

Brian D. Murphy, Martin Marietta Energy Systems, Oak Ridge National Laboratory, Oak Ridge, TN

A Conservative Finite Difference Method for a Two Dimensional Diffusion Convection Problem and its Application to the Navier-Stokes Equations

John B. Bell, Long Range Research Division, Exxon Production Research Company, Houston, TX; and Alan E. Berger, Jay M. Solomon, and William G. Szymczak, Applied Mathematics Branch, Naval Surface Weapons Center, Silver Spring, MD

Monday, October 28/4:00 PM
Contributed Papers 3/Navajo Room

STOCHASTIC AND DISCRETE SYSTEMS

Chairman: Al Erlsman, Boeing Computer Services, Tukwila, WA

Asymptotic Analysis of the Waiting-Time Distribution for a Large Closed Processor-Sharing System

John A. Morrison, Department of Mathematics of Communication and Computer Systems, AT&T Bell Laboratories, Murray Hill, NJ

Solutions of Quarter-Plane Difference Equations: Methods and Examples

Mary Anne Maher, Department of Industrial Engineering, New Mexico State University, Las Cruces, NM

Zero Crossings, Bandwidth Compression and Restoration of Nonlinearly Distorted Bandlimited Signals

Farokh Marvasti and Anil K. Jain, Department of Electrical and Computer Engineering, University of California, Davis, CA

Underwater Acoustic Pulse Propagation: A Stochastic Mechanical Analysis

Thad Dankel, Jr., Department of Mathematical Sciences, University of North Carolina, Wilmington, NC

On the Smallest Positive Singular Value of a Singular M-matrix with Applications to Ergodic Markov Chains

Jesse L. Barlow, Department of Computer Science, The Pennsylvania State University, University Park, PA

Summary of Event Time Variation Error Analysis Methods

James N. Churchyard, The Fortran Doctor, Costa Mesa, CA

On the Minimizing Total Tardiness in the n-Job, One-Machine Sequencing Problem

Tapan T. Sen, Management Science Department, School of Business, University of Tennessee, Chattanooga, TN; and Bolindra N. Borah, Department of Mathematics and Computer Science, North Carolina A&T State University, Greensboro, NC

Convergence Theory for the Fuzzy c-Means Algorithms

Richard J. Hathaway, Department of Mathematics and Statistics, University of South Carolina, Columbia, SC

The Spectrum of Random Nonuniform Samples

Farokh Marvasti, Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran

Monday, October 28/4:00 PM
Contributed Papers 4/Mohave Room

BIFURCATION PROBLEMS IN FLUID MECHANICS

Chairman: Gregory Baker, Department of Mathematics, University of Arizona, Tucson, AZ

The Finite Taylor Problem with Rotating Ends

Simon J. Tavener, Clarendon Laboratory, Oxford, England

Poincaré Bifurcations in Nodal Integral Method Solutions to the Navier-Stokes and Boussinesq Equations

Y. Y. Azmy and J. J. Dorning, Department of Nuclear Engineering and Engineering Physics, University of Virginia, Charlottesville, VA

Supercritical Hopf Bifurcation and the Nonlinear Stability of Two-Phase Flow

Rizwan-uddin and J. J. Dorning, Department of Nuclear Engineering and Engineering Physics, University of Virginia, Charlottesville, VA

Numerical Determination of Turning Point Bifurcation

Li Kaitai and Mei Zhen, Department of Mathematics, Xi'an Jiaotong University, Xi'an, Shaanxi Province, China

Numerical Analysis of Hopf Bifurcation Problems

Li Kaitai and Mei Zhen, Department of Mathematics, Xi'an Jiaotong University, Xi'an, Shaanxi Province, China

Tuesday, October 29/10:30 AM
Contributed Papers 5/Mohave Room

NUMERICAL FLUID MECHANICS II

Chairman: K. Y. Fung, Department of Aerospace and Mechanics Engineering, University of Arizona, Tucson, AZ

On Analysis of a Taylor Weak Statement for Hyperbolic Conservation Laws

A. J. Baker and J. W. Kim, Department of Engineering Science and Mechanics, University of Tennessee, Knoxville, TN

Numerical Modeling of Axisymmetric Shock Tube Flow with Area Changes

Ameer G. Mikhail and Charles J. Nietubicz, U. S. Army Ballistic Research Laboratory, Launch and Flight Division, Aberdeen Proving Ground, MD

Transonic Inviscid-Laminar Viscous Interactions in the Presence of Mass/Heat Transfer

Ram Bachan Ram, State University of New York, Oneonta, NY; Airfoil Aerodynamics Branch, NASA Langley Research Center, Hampton, VA

An Outflow Acoustic Boundary Condition for Internal Duct Flows

Marianne Mosher, NASA Ames Research Center, Moffett Field, CA

Boundary Conditions for Two-Phase Displacement in Heli-Shaw Cells

Douglas A. Reinelt, Department of Mathematics, Southern Methodist University, Dallas, TX

An Inverse Boundary-Layer Problem Optimal Solver

Fred R. Payne, Department of Aerospace Engineering and Mathematics and Ramakrishna Mokkpati, Department of Aerospace Engineering, University of Texas, Arlington, TX

A Conservative Difference Method For Hydrodynamics and Heat Transport in a Two-Temperature Plasma

P. M. Campbell, M. J. Dunning, and J. F. McGrath, KMS Fusion Inc., Ann Arbor, MI; and D. L. Hicks, Michigan Technology University, Houghton, MI

Equations of Fluid Erosion

Franz Helfenstein, Department of Mathematics, Oregon State University, Corvallis, OR

Tuesday, October 29/10:30 AM
Contributed Papers 6/Pinal Room

NUMERICAL SOLUTION OF BIFURCATION PROBLEMS

Chairman: George W. Reddien, Jr., Department of Mathematics, Southern Methodist University, Dallas, TX

Continuation and Local Perturbation for Multiple Bifurcations

Eugene L. Allgower, Department of Mathematics, Colorado State University, Fort Collins, CO

Multi-grid Continuation for Parameter-dependent Nonlinear Boundary Value Problems

Hans D. Mittelmann, Department of Mathematics, Arizona State University, Tempe, AZ

Buckling of Coupled Elasticas

Simon J. Tavener, Clarendon Laboratory, Oxford, England

Symmetry and Global Bifurcation with Applications to Solid Mechanics

Timothy J. Healey, Department of Mathematics, University of Maryland, College Park, MD

Numerical Continuation and Bifurcation Problems in Nonlinear Parametric Programming

Aubrey B. Poore, Department of Mathematics, Colorado State University, Fort Collins, CO

A Numerical Procedure for the Solution of Nonlinear Eigenvalue Problems

Eugene Don, Department of Mathematics, Queens College, Flushing, NY

Spurious Period Doublings in Discrete Approximations to Differential Equations

Ira B. Schwartz, U. S. Naval Research Company, Washington, DC

Tuesday, October 29/3:30 PM
Contributed Papers 7/Cochise Room

FINITE ELEMENT METHODS

Chairman: William B. Bickford, Department of Mechanical and Aerospace Engineering, Arizona State University, Tempe, AZ

On the Use of the Boundary Integral Method to Solve the Laplace and Biharmonic Equations in Domains of Complex Geometry

Marc S. Ingber and Ambar K. Mitra, Department of Engineering Science and Mechanics, Iowa State University, Ames, IA

Pressure Characterization in 2-d Stokes Problems by Using Scalar Potentials

C. Dierieck, Philips Research Laboratories, Brussels, Belgium

A Third Order Artificial Boundary Condition for the Exterior Stokes Problem in Three Dimensions

Georges H. Guirguis, Department of Mathematics, North Carolina State University, Raleigh, NC

Application of Topological Techniques to the Analysis of Asymptotic Behavior of Finite-Element Solutions of a Reaction-Diffusion Equation

Sat Nam S. Khalsa, Department of Mathematics, Iowa State University, Ames, IA

Analysis of Plates by Common Boundary Element Method

Bulent A. Ovunc and Ololade Owokoniran, Department of Civil Engineering, University of Southwestern Louisiana, Lafayette, LA

Spline Approximation for a Problem in Age-dependent Population Dynamics

Thomas H. Barr, Department of Mathematics and Computer Science, Rhodes College, Memphis, TN

A Sensitivity-weighted Adaptive Finite Element Method for Sets of Differential Equations

J. B. Sweeney, H. T. Davis, and L. E. Scriven, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN

Tuesday, October 29/3:30 PM
Contributed Papers 8/Arizona Room

SYSTEMS THEORY AND APPLIED MATHEMATICS

Chairman: Robert S. Stepleman, Exxon Research and Engineering Company, Baytown, TX

A Bayesian Approach to Target Motion Analysis

Edgar A. Cohen, Applied Mathematics Branch, Naval Surface Weapons Center, White Oak, Silver Spring, MD

The Four-Ports Dynamic System

Alan P. Wang, Department of Mathematics, Arizona State University, Tempe, AZ

Stability Analysis of Hybrid Composite Dynamical Systems: Descriptions Involving Operators and Differential Equations

Mohsen S. Mousa and Richard K. Miller, Department of Mathematics, Iowa State University, Ames, IA; and Anthony N. Michel, Department of Electrical Engineering, University of Notre Dame, Notre Dame, IN

An Asymptotic Theory of Rectification and Detection

Gregory A. Kriegsmann, Department of Engineering Sciences and Applied Mathematics, The Technological Institute, Northwestern University, Evanston, IL

The Symmetric Difference Model for Dialectical Psychology

William C. Hoffman, Department of Mathematical Sciences, New Mexico State University, Las Cruces, NM

On the Radial Packing of Variable Diameter Circles Filling the Plane

Patrick D. Weidman, Department of Mechanical Engineering, University of Colorado, Boulder, CO

Wednesday, October 30/10:30 AM
Contributed Papers 9/Mohave Room

NUMERICAL ANALYSIS AND INTEGRAL EQUATIONS

Chairman: Richard K. Miller, Department of Mathematics, Iowa State University, Ames, IA

Solving Volterra Integral Equations with ODE Codes

L. F. Shampine, Numerical Mathematics Division, Sandia National Laboratories, Albuquerque, NM

Galerkin Methods for Abel-type Integral Equations

P. P. B. Eggermont, Department of Mathematical Sciences, University of Delaware, Newark, DE

The Convergence of Several Algorithms for Integral Equations with Finite Part Integrals

Michael A. Golberg, Department of Mathematical Sciences, University of Nevada, Las Vegas, NV

Inversion of Ill-Posed Integral Equations of the First Kind is (Usually) a Waste of Time

Peter E. Castro, Management Services Division, Eastman Kodak Company, Rochester, NY

Multi-Objective Optimization with Interactive Computer Graphics

J. E. Dennis, Jr. and Daniel J. Woods, Department of Mathematical Sciences, Rice University, Houston, TX

Self-Validating Quadrature Near Singularities

George F. Corliss, Department of Mathematics, Statistics, and Computer Science, Marquette University, Milwaukee, WI

Fast Banded Systems Solvers for Ensemble Architectures

Lennart Johnsson, Department of Computer Science, Yale University, New Haven, CT

A Hybrid Technique for Nonlinear Least Squares

J. Thomas Haigh, System Analysis and Operations; and Wayne E. Simon, Department of Mechanics, Martin Marietta Aerospace, Denver, CO

Contributed Papers

Wednesday, October 30/10:30 AM
Contributed Papers 10/Cochise Room

BIFURCATION

Chairman: David Fox, Air Force Office of Scientific Research, Bolling Air Force Base, Washington, D C

Competition For a Renewable Resource in a Periodic Environment

Jack Hale and Alfredo Somolinos, Division of Applied Mathematics, Brown University, Providence, RI

The Region of Attraction of a Stationary Solution in the Presence of Hopf Bifurcation
Brian D. Hassard and Laszlo T. Szebelledy, Department of Mathematics, State University of New York, Buffalo, NY

A Nonlinear Theory for Maximum-Loaded-Oscillators with the Andronov-Hopf-Bifurcation Theorem

Wolfgang Mathis and Ingo Weghorst, Institut für Allgemeine Elektrotechnik, Technische Universität Braunschweig, West Germany

The Behavior of Buckled States of a Cosserat Rod Subject to Symmetry Breaking Perturbing Loads

John F. Pierce, Department of Mathematics, West Virginia University, Morgantown, WV

The Effects of the Secondary Resonances on the Forced Motion of a Simple Pendulum
Mohammad B. Daffar, Department of Computer Science, Bowling Green State University, Bowling Green, OH; James F. Geer, Department of Systems Science, Thomas J. Watson School of Engineering, State University of New York, Binghamton, NY

Multiparameter and Multibranch of Bifurcation Problems and Their Approximations

Li Kaitai and Zhang Chengdian, Department of Mathematics, Xi'an Jiaotong University, Xi'an, Shaanxi Province, China

Wednesday, October 30/3:30 PM
Contributed Papers 11/Pima Room

FUNCTIONAL AND ORDINARY DIFFERENTIAL EQUATIONS

Chairman: Linda Kaufman, AT&T Bell Laboratories, Murray Hill, NJ

RKH-Space Approximation For The Feedback Operator In A Linear Hereditary Control System

Robert E. Fennell and James A. Reneke, Department of Mathematical Sciences, Clemson University, Clemson, SC

Shifting the Closed-Loop Spectrum in the Optimal Linear Regulator Problem for Hereditary Systems

J. S. Gibson, Department of Mechanical Aerospace and Nuclear Engineering, University of California, Los Angeles, CA; and I. G. Rosen, Department of Mathematics, University of Southern California, Los Angeles, CA

Stabilization of Non-Linear Delay Differential Equations With Several Incommensurate Delays

Erol Emre and Gareth Knowles, Department of Electrical Engineering and Computer Science, Texas Tech University, Lubbock, TX

Conjugate Gradient-Like Algorithms for Solving Nonlinear Systems Arising in the Numerical Integration of Stiff ODEs

Anthony Chronopoulos, Department of Computer Science, University of Illinois, Urbana, IL

Uniform High-Order Polynomial-Based Difference Schemes for a Model Singularly Perturbed Problem

Eugene C. Gartland, Jr., Department of Mathematics, Southern Methodist University, Dallas, TX

Convergence of Dynamic Iteration Methods for Initial Value Problems

Ulla Miekkala and Olavi Nevanlinna, Institute of Mathematics, Helsinki University of Technology, Espoo, Finland

Convergence Domains and Stability Regions
Ulla Miekkala and Olavi Nevanlinna, Institute of Mathematics, Helsinki University of Technology, Espoo, Finland

Stability Analysis of Difference Equation Models of the Logistic Equation

Ronald E. Mickens, Department of Physics, Atlanta University, Atlanta, GA

Bifurcation to Rapidly Oscillating Solution of a Differential-Delay Equation

Jacques Belair, Department of Mathématiques et de Statistique, Université de Montréal, Québec, Canada

Wednesday, October 30/3:30 PM
Contributed Papers 12/Arizona Room

VLSI

Chairman: Robert Grafton, Office of Naval Research, Arlington, VA

Orthogonal Collocation and Multigrid Poisson Solvers for the Simulation of Semiconductor Devices with Narrow Conduction Channels
Umberto Ravaioli and David K. Ferry, Center for Solid State Electronics Research, Arizona State University, Tempe, AZ

Continuation Methods for Semiconductor Device Equations

Christian Schmeiser, Department for Applied Mathematics and Numerical Analysis, Technical University Vienna, Wien, Austria

A Three-Dimensional Mosfet Simulator

L. A. Akers and K. L. Hsueh, Center for Solid State Electronic, Arizona State University, Tempe, AZ

3 Dimensional MOSFET Simulator

Thomas A. DeMassa, Glenn M. Wakefield, and James Wakefield, Department of Electrical Engineering, Arizona State University, Tempe, AZ

Considerations in the Numerical Modeling of Small-Geometry Bipolar Transistors

Edwin W. Greenleach, Department of Electrical and Computer Engineering, Arizona State University, Tempe, AZ

Variational Techniques for Electronic Transport Studies

John G. Shaw, Integrated Circuit Laboratory, Xerox Palo Alto Research Center, Palo Alto, CA

A Quasi-Three Dimensional Mosfet Model

K. L. Hsueh and L. A. Akers, Center for Solid State Electronics, Arizona State University, Tempe, AZ

A Monte Carlo Chip

Arthur Knoebel, Department of Mathematical Sciences, New Mexico State University, Las Cruces, NM

A Highly Convergent Method for the Solution of Semiconductor Transport Equations as an Alternative to Newton's Method

Osman Ersed Akcasu, Fairchild Camera and Instrument Corporation, Device Modeling Group, Puyallup, WA

Wednesday, October 30/3:30 PM
Contributed Papers 13/Mohave Room

FLUID MECHANICS

Chairman: Helen Reed, Department of Mechanical and Aerospace Engineering, Arizona State University, Tempe, AZ

Vortex Blob Simulation of the Rayleigh-Taylor Instability

Robert M. Kerr, Lawrence Livermore National Laboratory, Computational Physics Division, Department of Physics, Livermore, CA

Some Applications of a "Hodograph" Approach for the Numerical Calculation of 2-D Vortex Flows

Saleh Tanveer, Department of Mathematics, Virginia Polytechnic Institute and State University, Blacksburg, VA

How Conservation Principles are Satisfied by Discrete Vortex Methods

Richard W. Bartholomew, Department of Mechanical Engineering, Michigan State University, East Lansing, MI

An Investigation on the Onset Mechanism of Organized Motion in Turbulent Jets

D. Y. Chen, Garrett Turbine Engine Company, Phoenix, AZ

Progress in the Development of a Second Order Vorticity Turbulence Closure

Charles M. H. Dai, Naval Hydromechanics Division, Ship Performance Department, David Taylor Naval Ship R&D Center, Bethesda, MD

Aeroacoustic Computation of Free Shear Layer Flow

Stanley L. Lamkin, Kentron International Inc., Hampton, VA; and Jay C. Hardin, NASA Langley Research Center, Hampton, VA

Asymptotic Expansions and Outflow Boundary Conditions for the Navier-Stokes Equations

Thomas M. Hagstrom, Department of Applied Mathematics and Statistics, State University of New York, Stony Brook, NY

Wednesday, October 30/3:30 PM
Contributed Papers 14/Navajo Room

MATHEMATICAL PROBLEMS IN THE PHYSICAL SCIENCES

Chairman: Alan P. Wang, Department of Mathematics, Arizona State University, Tempe, AZ

Compression of a Confined Inert Gas by a Piston

D. R. Kassoy, Department of Mechanical Engineering, University of Colorado, Boulder, CO

Heat Conduction within an Elastic Earth and its Implications Concerning the Deformation of the Lithosphere

Paolo Lanzano, Acoustics Division, Naval Research Laboratory, Washington, D.C.

Elements of a Computational Theory for Glaciers

S. Yakowitz, Department of Systems and Industrial Engineering, The University of Arizona, Tucson, AZ; K. Hutter, Department of Hydrology & Glaciology, Eidgenössische Technische Hochschule, Zurich, Switzerland; F. Szidarovszky, Department of Computer Sciences, University of Agriculture, Villanyi, Hungary

Contributed Papers

Uniform Spectral Estimate for the Linearized Navier-Stokes Operators and Their Galerkin Approximations

Edriss Saleh Titi, Department of Mathematics, Indiana University, Bloomington, IN

Twistor Techniques for Solving Nonlinear Partial Differential Equations

Philip B. Yasskin, Department of Mathematics, Texas A&M University, College Station, TX

Refining the Estimate of the Gravitational Constant

Bert W. Rust and Jeffrey H. Dunn, Center for Applied Mathematics, National Bureau of Standards, Gaithersburg, MD

Progress in the Calculation of Lower Bounds to Eigenvalues of Atomic Hamiltonians

David M. Russell, Department of Mathematical Sciences, University of North Carolina, Wilmington, NC

Gauss-Codazzi Equations and Kaluza-Klein Theories

Gabriel G. Lugo, Department of Mathematical Sciences, University of North Carolina, Wilmington, NC

Tuesday, October 29/10:30 AM
Poster Session 1/Coconino Room

The Electrostatic Potential Fields Exterior and Interior To a Thin Axially Symmetric, Plane Symmetric Oblate Dielectric Body

Richard N. Barshinger, Department of Mathematics, The Pennsylvania State University, The Worthington Scranton Campus, Dunmore, PA

The Reconstruction of a Signal from the Zero Crossings of an FM Signal

Farokh Marvasti, Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran

Applications of the Noor Reduced Basis Method in Slender Body Theory

James Geer, Department of Systems Science, Watson School of Engineering, Applied Science, and Technology, State University of New York, Binghamton, NY; Carl M. Andersen, Department of Mathematics and Computer Science, The College of William and Mary, Williamsburg, VA

Parameter Sensitivity in Robotic Modeling

Dennis W. Brewer, Department of Mathematical Sciences, University of Arkansas, Fayetteville, AR; and ICASE NASA Langley Research Center, Hampton, VA; J. S. Gibson, Department of Mechanical Engineering, University of California, Los Angeles, CA

POSTER PRESENTATIONS

The Application of a Spectral Tau Method to The Navier-Stokes Equations in Two Dimensions

Charles H. Finan, Schlumberger-Doll Research, Ridgefield, CT

Computations of Bifurcation in Fluid Mechanics

K. A. Cliffe and K. H. Winters, Theoretical Physics Division, AERE Harwell, England

Nonparametric Series-Based Trivariate Density Estimation

William R. Freeman, West Coast Cancer Foundation, San Francisco, CA; and Michael E. Tarter and Miguel Lucero, Division of Biostatistics and Environmental Health, University of California, Berkeley, CA

Constrained Least Squares Approximations to Freon Refrigerant Properties

David R. Ferguson and Richard A. Mastro, Boeing Computer Services, Engineering Technology Applications Division, Tukwila, WA

Wednesday, October 30/10:30 AM
Poster Session 2/Coconino Room

Repeat of Poster Session 1

THINGS TO DO, PLACES TO SEE

Escape the cold weather and join us on the beautiful palm-studded campus of Arizona State University for the SIAM Fall Meeting. The days should be clear, with temperatures in the low 80s, and the nights mild, excellent for a comfortable night's sleep. We even promise you a full moon over the desert!

The Tempe-Phoenix-Scottsdale area offers ample opportunity to sightsee, shop, hike, eat, and explore the cultural attractions of the West. See the Desert Botanical Garden, featuring over 12,000 plants from arid lands around the world, or the Central Arizona Museum of History. For flying buffs, visit the Champlin Fighter Museum. Cultural sites include the Heard Museum on Indian Cultures of the Southwest and the Mesa Museum.

Tempe is also an excellent staging area for trips to the Grand Canyon, one of the great natural wonders of the world. Those interested in geology might also want to visit the colorful Painted Desert, or Mongollon Rim, a magnificent geological fault whose face consists of a multicolored wall of rock, speckled with pine, manzanita and oak shrub. The Rim was made famous by author Zane Grey, whose cabin is still standing for visitors to see.

Visit Painted Rocks State Historical Park and see the petroglyphs, Indian writings and prehistoric rock paintings. You may also view Montezuma's Castle, an impressive ancient Indian cliff dwelling nestled high above Beaver Creek, over six centuries old!

For the engineers in the group, the Hoover Dam and Glen Canyon Dam, the two highest dams in the country, are not to be missed. The

Hoover Dam links Arizona to Nevada and forms Lake Mead, the largest manmade lake in the US, popular for water sports and fishing.

For the statisticians, Las Vegas is located across the state line.

Before and After

PHOENIX SYMPHONY

Saturday, October 26, 8:00 pm

Attention "Supersavers" and Other Early Arrivals:

Plan now to spend Saturday evening, October 26, with the Phoenix Symphony Orchestra as they perform Beethoven's magnificent *Symphony No. 9 in D minor* and Samuel Barber's *Knoxville: Summer of 1915* in world-renowned Grady Gammage Auditorium on the Arizona State University campus.

This remarkable concert hall, designed by Frank Lloyd Wright, is located only a short walk from the conference site, and is considered one of Arizona's cultural landmarks.

The concert will begin promptly at 8 pm. Ticket prices, specially discounted for the SIAM meeting, are \$23.40 and \$18.00 (main floor and balcony) and \$13.50 (2nd balcony).

To reserve your seats, send your check indicating your choice of main floor or balcony before October 12 to:

Phoenix Symphony Orchestra
6328 N. 7th Street
Phoenix, AZ 85014
Attn: N. Beams (SIAM)

Your tickets will be waiting for you at the "Will Call" window the night of the performance.

TWO-DAY GRAND CANYON TOUR

Thursday, October 31 - Friday, November 1

Visit one of the Seven Wonders of the World. The spectacular sunrises and sunsets are a photographer's delight. This escorted motor coach tour includes deluxe rooms (close to the rim if you book by September 30) with two double beds, Montezuma's Castle National Monument, picturesque Sedona, Oak Creek Canyon, Sunset Crater, lava fields, Cameron Trading Post on the Navajo Reservation, and views of the Painted Desert and Navajo hogans.

Prices (U.S. \$): \$85.00/person for two people per room; \$105.00 for single occupancy. Make check payable and send it to Windows of the West Tours, 4342 E. Highlands Drive, Paradise Valley, AZ 85253 (Tel. 602/840-8245). Include your printed name, address, phone number, name of double room partner (if applicable), and self-addressed, stamped envelope. Rooms close to the rim will be booked while available, but only until September 30. Act fast! First come, first served. Late bookings may have to be forwarded to Gray Line. Gray Line rooms are farther from the rim and their tour omits some stops. Bring comfortable walking shoes, and a warm jacket for the 7000-foot elevation. The convention hotels will store your luggage and re-register you at the convention rates upon your return.

Departs Tempe hotels at 7:30 AM, Thursday, October 31. Returns there at 6:00 PM, Friday, November 1.

TRANSPORTATION INFORMATION

By Air to Phoenix

Parkway Travel has been selected to be the official agent for the conference and will guarantee the lowest rates available to the SIAM Fall Meeting. You must fly to Phoenix, which is 15 minutes by car, limo, or taxi to Tempe.

Calling hours are 8:30 am - 5:30 pm (EST) Monday through Friday and 10:00 am - 2:00 pm on Saturday. Call toll free from the U.S. 1-800-235-6500. If calling from abroad, phone 1-215-235-6000. **BE CERTAIN TO MENTION THAT YOU ARE ATTENDING THE SIAM MEETING IN PHOENIX.** Parkway will mail you tickets or arrange for them to be waiting for you at the airport of your choice.

Special Discount: US Air has been chosen as the official carrier for the meeting and they have agreed (through Parkway Travel) to offer up to 50% discounts on certain flights. These special fares will not be available through any agency other than Parkway Travel and we suggest that you call them before making other arrangements. Parkway will guarantee you the lowest fare no matter which carrier you choose. In order to get the flight of your choice, we suggest making reservations as soon as possible.

From the Airport

By Shuttle

The conference site is a 15 minute drive from the airport. Both the Holiday Inn (968-3451) and Howard Johnson's (967-9431) provide free, 24-hour courtesy service to and from the airport. On arrival, you must call them and they will arrange a pick-up. The Vagabond Motel (968-7793) hopes to offer this service by October, 1985. You must make a reservation with the hotels in advance to return to the airport.

By Taxi

The cabs in the Phoenix-Tempe area are deregulated. Bargaining for fares is encouraged, especially for out-of-towners. Try to get several quotes before choosing a carrier. The fare should be \$8-\$10.

Taxi Pooling: SIAM will send a red sticker to all attendees who preregister for the conference. Affix the sticker to your left shoulder at the airport to identify yourself as an attendee at the SIAM Fall Meeting and look for your colleagues to pool taxi rides.

By Car to the Hotels

Go east ½ mile on Airport Drive to 44th Street. Turn right on 44th and proceed ½ mile to University Drive. Go left on University Drive and continue about 3 miles to Mill Avenue. Go right on Mill about ¾ mile and follow it around the large bend as Mill Avenue changes its name to Apache Boulevard. Gammage Auditorium will be on your left, and Howard Johnson's will be on your right (south side). Holiday Inn is east on Apache about ½ mile from Howard Johnson's and on the right. Vagabond is ¼ mile east of Holiday Inn and also on the right (south side).

By Car to the Conference Site

Howard Johnson's is on Apache Boulevard at College Avenue. From the corner, drive north one block on College Avenue. Turn right on Lemon Street. Proceed one more block to the attendant. Purchase visitor parking and ask the attendant for directions to the Memorial Union (a short walk).

By Car

From the North, take I-17 South, which becomes the Maricopa Freeway. Take I-17 until it becomes I-10, also known as the Pima Freeway. Just past Phoenix, turn onto Route 360 East, also called Superstition Freeway. Proceed to Rural Road and go left (north) for 2 miles to Apache Boulevard. Turn left on Apache and proceed ½ mile west to College Avenue. Turn right on College and drive north for one block. Turn right on Lemon Street. Proceed one more block to the attendant. Purchase visitor parking and ask the attendant for directions to the Memorial Union (a short walk).

From Tucson and points South, take I-10 North to 360 East. Follow directions as listed above.

From points West, come in on I-10, which will connect to 360 East. Follow the directions as listed above.

From points East, U.S. 60 becomes Apache Boulevard in Tempe. Follow the directions as listed above.

Car Rental

Avis has been chosen as the official car rental agency for the SIAM Fall Meeting. The specially discounted rates (unlimited mileage) are:

| CAR GROUP | DAILY | WEEKLY |
|------------------|-------|--------|
| Subcompact | \$27 | \$ 94 |
| Compact | 29 | 144 |
| Intermediate | 31 | 159 |
| Full Size 2-Door | 33 | 189 |
| Full Size 4-Door | 35 | 209 |

- You should have an advance reservation to guarantee availability. Call toll free 1-800-331-1600 and mention Avis Worldwide Discount Number A/A480002 to obtain the discounted rates. Please identify yourself as an attendee of the SIAM Fall Meeting.
- Rates will be honored at the rental counters without advance reservations if cars are available.
- Cars must be picked up and dropped off at the airport.
- You must be 18 years of age and have a credit card to rent a car.
- Avis accepts AMEX, VISA, Mastercard, Diners Club, Carte Blanche, Air Travel Card, and Avis.

HOTEL INFORMATION

SIAM has reserved rooms at three hotels near the conference site. There are a limited number of rooms at each hotel and they will be available on a first come, first served basis. Rooms will be held for our exclusive use until October 11, 1985, after which they will be released to the general public. We urge you to make your reservations early.

There are two ways to make a reservation:

By Phone

You may make your reservation by telephone. This is the best method; it will guarantee you a room at one of the hotels immediately, as the receptionist will be able to confirm availability. **Be Certain to Identify Yourself as an Attendee at the SIAM Fall Meeting in Order to Obtain the Specially Discounted Rates Quoted Herein.** Also ask the reservationist to send you a confirmation by mail, or ask for his/her name.

By Hotel Reservation Request Form

You may make your reservation via the Hotel Reservation Request Forms contained in this brochure. If your hotel of first choice is booked, they will forward your reservation to one of the other hotels. A confirmation will be sent to you, provided that you make your reservations early. Do not forget to put a stamp on the form!

If you list your credit card number on the form, we suggest that you enclose the form in an envelope.

Hotels

Listed in order of distance from the conference site. SIAM will provide shuttle service, where necessary.

Howard Johnson's (1 block) Single \$42.00
225 E. Apache Blvd Double \$52.00
Tempe, AZ 85281
(602) 967-9431

Holiday Inn (3/4 mile) Single \$48.00
915 E. Apache Blvd Double \$57.00
Tempe, AZ 85281
(602) 968-3451

Vagabond Motel (1 mile) Single \$28.00
1221 E. Apache Blvd Double \$34.00
Tempe, AZ 85281
(602) 968-7793

Hotel prices in Tempe are in line with nationally accepted standards.

REGISTRATION INFORMATION

The registration desk will be located in the Arizona Room, on the second floor of the Memorial Union Building at Arizona State University. It will be open as listed below.

Sunday, October 27: 5:00 pm - 10:00 pm

Monday, October 28 - Wednesday, October 30: 7:30 am - 6:00 pm

| | SIAM/ SIGNUM MEMBER | NON MEMBER | FULL-TIME STUDENT |
|-------------------|------------------------------|---------------|----------------------|
| Registration Fees | Advance \$50 On Site \$70 | \$75 \$95 | \$5 \$5 |

Patio Party
Monday, October 28, 7:00 pm
Arizona State University
\$10.00

Desert Cookout
Tuesday, October 29, 6:15 pm
Price includes beer, wine, and transportation
\$25.00

Non-member registrants are encouraged to join SIAM in order to obtain the member rate for conference registration and enjoy all the other benefits of SIAM membership.

Special Note:

There will be no prorated fees. There will be no refunds after the conference starts. *SIAM does not accept credit cards.*

RESERVATION CHANGES AND LATE ARRIVAL POLICY

If you need to change or cancel a reservation, be certain to contact the hotel by 4:00 pm Tempe time on your stated day of arrival.

If you plan to arrive after 6:00 pm, you must guarantee one night's payment by credit card.

RESERVATION REQUEST FORM

HOWARD JOHNSON'S, 225 E. Apache Blvd., Tempe, AZ 85281 SIAM Fall Meeting, October 28-30, 1985

Specially discounted rooms will be available for our exclusive use only until October 11, 1985, after which availability cannot be guaranteed. Reservations will be taken on a first come, first served basis.

Name _____ Phone _____

Please Print

Address _____

City _____ State _____ Zip _____

I would like to guarantee my room for late arrival * by

☐ AMEX _____ ☐ MC _____ ☐ VISA _____

Card Number _____ Expiration Date _____

Please reserve: ☐ Single (\$42) ☐ Double (\$52)

Arrival Date _____ Arrival Time _____

Departure Date _____

* If you list your credit card number, we suggest that you enclose this card in an envelope and mail to: Reservations, Howard Johnson's, 225 E. Apache Blvd., Tempe, AZ 85281

RESERVATION REQUEST FORM

VACABOND MOTEL, 1221 E. Apache Blvd., Tempe, AZ 85281 SIAM Fall Meeting, October 28-30, 1985

Specially discounted rooms will be held for our exclusive use only until October 11, 1985. After that, reservations will depend on availability.

Name _____ Phone _____

Please Print

Address _____

City _____ State _____ Zip _____

I would like to guarantee my room for late arrival * by

☐ AMEX _____ ☐ MC _____ ☐ VISA _____

Card Number _____ Expiration Date _____

Please reserve: ☐ Single (\$28) ☐ Double (\$34)

Arrival Date _____ Arrival Time _____

Check out date _____

* If you list your credit card number, we suggest that you enclose this card in an envelope and mail to: Reservations, Vocabond Motel 1221 E. Apache Blvd., Tempe, AZ 85281

RESERVATION REQUEST FORM

HOLIDAY INN, 915 E. Apache Blvd., Tempe, AZ 85281 SIAM Fall Meeting, October 28-30, 1985

Specially discounted rooms will be held for our exclusive use only until October 11, 1985, after which availability cannot be guaranteed. Reservations will be taken on a first come, first served basis.

Name _____ Phone _____

Please Print

Address _____

City _____ State _____ Zip _____

I would like to guarantee my room for late arrival * (after 6:00 pm) by

☐ AMEX _____ ☐ MC _____ ☐ VISA _____

Card Number _____ Expiration Date _____

Please reserve: ☐ Single (\$48) ☐ Double (\$57) ☐ King ☐ Two Doubles

Arrival Date _____ Number of Nights _____

Departure Date _____

* If you list your credit card number, we suggest that you enclose this card in an envelope and mail to: Reservations, Holiday Inn, 915 E. Apache Blvd., Tempe, AZ 85281

ADVANCED REGISTRATION FORM SIAM Fall Meeting

* Advance registration must be received at the SIAM office by October 23, 1985.

SIAM/SIGNUM Member Non-Member Full-Time Student

| Registration Fees | Advance | On Site | \$50 | \$70 | \$75 | \$95 | \$5 | \$5 |
|-------------------|---------|---------|------|------|------|------|-----|-----|
|-------------------|---------|---------|------|------|------|------|-----|-----|

Registration amount enclosed \$ _____ \$ _____ \$ _____

Patio Party \$10.00 \$ _____ \$ _____

Monday, October 28, 7:00 pm \$ _____ \$ _____

Desert Cookout \$25.00 \$ _____ \$ _____

Tuesday, October 29, 6:15 pm (includes beer, wine and transportation) \$ _____ \$ _____

TOTAL amount enclosed \$ _____ \$ _____

Name _____ Telephone _____

Department _____ Affiliation _____

Address _____

City _____ State _____ Zip _____

I am a member of: ☐ SIAM ☐ Other(s) _____ ☐ Please send me information about membership in SIAM. Detach card, and enclose with payment in the envelope provided (domestic mail only), and mail to: SIAM.

SIAM
117 South 17th Street
14th Floor
Philadelphia, PA 19103-5052
U. S. A.

POSTMASTER PLEASE DELIVER TO:

Nonprofit
Organization
U. S. Bulk
Postage-Paid
SIAM

FROM:

Place
Stamp
Here

RESERVATIONS
Holiday Inn
915 E. Apache Boulevard
Tempe, AZ 85281

FROM:

Place
Stamp
Here

RESERVATIONS
Howard Johnson's
225 E. Apache Boulevard
Tempe, AZ 85281

FROM:

Place
Stamp
Here

RESERVATIONS
Vagabond Motel
1221 E. Apache Boulevard
Tempe, AZ 85281