

ICIAM 91



SECOND

MATHEMATICS

Final Program
INTERNATIONAL CONFERENCE ON INDUSTRIAL AND APPLIED

July 8-12, 1991

◆ Sheraton Washington Hotel ◆

Washington, D.C. USA

Fluid Mechanics II

Exhibit Hall B/C

Discontinuous Finite Elements for the Steady Compressible Euler Equations

Jérôme Jaffré, INRIA, France; Lahcen Kaddouni, INRIA, France

Phase Shift for Perturbed Strongly Nonlinear Oscillatory Dispersive Traveling Waves

Richard Haberman, Southern Methodist University

The Wright Stuff: A Mathematical Analysis of the Aerodynamics of Flight

Robert N. McCullough, Ferns State University

Acoustic Scattering by an Absorbing Half Plane Due to Gaussian Pulse

S. Asghar, Quaid-i-Azam University, Pakistan; Amjad Mahmood Lone, Quaid-i-Azam University, Pakistan

Automatic Adaptive Remeshing for Navier-Stokes

Ralf Tlilch, CERFACS, France; R. Lohner, NASA Langley Research Center

Numerical Simulation of Large Free Surface Deformations Using a 3D Boundary Element Method

Georges L. Chahine, Dynaflo, Inc.; A.N. Lakshminarasimha, Dynaflo, Inc.

Transient Inviscid Bubble Dynamics

John P. Best, University of Wollongong, Australia; John R. Blake, University of Birmingham, United Kingdom

A Modified High Order Godunov Method for Gas Dynamics

Xuefeng Li, Loyola University

Computation of 2-D Reacting Boundary Layers

E. Boillat, Swiss Federal Institute of Technology, Switzerland; J. Poussin, Swiss Federal Institute of Technology, Switzerland

Investigation of the Hydrodynamics of Bods Immersion in Liquid

N.V. Polyakov, State University of Dnepropetrovsk, USSR

Numerical Simulation of the Multiphase Vorticity Flows Movement

V.B. Kamen, State University of Dnepropetrovsk, USSR; Yu. L. Voronovsky, State University of Dnepropetrovsk, USSR

Some Mathematical Models of Vorticity Flows Movement in Incompressible Viscous Fluid

V.B. Kamen, State University of Dnepropetrovsk, USSR; Yu. L. Voronovsky, State University of Dnepropetrovsk, USSR

High Frequency Discharge in Turbulent Swirling Flows

M.P. Strongin, Altai Polytechnical Institute, USSR; K.B. Koshelev, Altai Polytechnical Institute, USSR

Geophysical Sciences

Exhibit Hall B/C

Petrov-Galerkin Methods for Reservoir Flow Problems

Helge K. Dahle, University of Bergen, Norway; Magne S. Espedal, University of Bergen, Norway; Ove Saevareid, University of Bergen, Norway

Intelligent Data Fitting and Reconstruction of 3D Interval Velocity

Chen Li, Wuhan University, Peoples Republic of China; Zhang Lan, Wuhan University, Peoples Republic of China

Numerical Approximation of a Seismic Reflection Hyperbolic Equation

Enrique Rodríguez, INTEVEP, S.A., Venezuela

An Efficient Scheme for the Solution of Linear Systems Arising from Coupled Differential Equations

David Bulwani, University of Auckland, New Zealand; George Zyzolanski, Los Alamos National Laboratory

Oil and Gas Reservoirs in Subterranean Water Flows

Alexander Gutnikov, Institute of Oil and Gas Research, USSR; Osher Joldasov, Institute of Oil and Gas Research, USSR; Sumbar Zakirov, Institute of Oil and Gas Research, USSR; Vladimir Shvedoff, University of San Francisco

Mathematical Modelling of Fluid Flow Modification Due to Geochemical Reaction Between Fluids and Porous Media

Khalil Ghabace, Winfrith Petroleum Technology, United Kingdom; D.M. Burley, University of Sheffield, United Kingdom; Charles Curtis, University of Manchester, United Kingdom

Equivalence Criteria in Structure-Soil Interaction Modeling

Ivan Nemeč, Technical Institute Dupravorprojekt Brno, Czechoslovakia

Atmospheric Science

Exhibit Hall B/C

Weight Monte Carlo Methods in Solving Stochastic Problems of Transfer Theory

Boris A. Kargin, USSR Academy of Sciences, USSR

Wind Driven Circulation in the Western Bay of Bengal

Prakash C. Sinha, Indian Institute of Technology, India

Drift Motions for Floating Structures

M. Rahman, Technical University of Nova Scotia, Canada

Computational Aspects of Meteorological Data Assimilation

James W. Pfleindler, NASA Goddard Space Flight Center

Chemical Kinetics

Exhibit Hall B/C

Travelling Waves of the Equation for the Flame Fronts and Ferro-magnetic Chain

Hong-yan Fu, Institute of Applied Physics and Computational Mathematics, Peoples Republic of China

Heat Transfer Enhancement by Chaotic Advection in an Eccentric Annulus

S. Ghosh, University of Notre Dame; H.-C. Chang, University of Notre Dame; N. Acharya, University of Notre Dame; M. Sen, University of Notre Dame

Primary and Secondary Bifurcation in a Two-Dimensional Spatial Model of the BZ Reaction with Radial Symmetry

Nicholas N. Greenbaum, Trenton State College

Cellular Automata Simulation of Steady-State Diffusion-Controlled Reaction Rates in Dispersions of Static Sinks

W. Scott Leap, University of Delaware; Antony N. Beris, University of Delaware

Monte Carlo Simulation of Rarefied Gas Flows on the Connection Machine

Leonardo B. Dagum, NASA Ames Research Center

Numerical Simulation of Reactive Flow in Complex Geometry

K.D. Nguyen, Principia R&D and Universit of Lille 1, France; J.M. Le Gouez, Principia R&D, France; H. Vivand, Principia R&D, France; M. Cazalens, Sncma YKCN, France

Large Time Behavior of Galerkin Approximations and Stationary Solutions to Reaction-Diffusion Equations

Arnold Dikansky, St. Johns University

Environmental Science

Exhibit Hall B/C

Complex Boundary Elements for Contaminant Transport Studies

Theodore V. Bromadka II, California State University, Fullerton and Williamson and Schmid, Irvine

Method of Characteristics Models for Multiphase Flow of Subsurface Contaminants

James W. Weaver, United States Environmental Protection Agency

Simulation and Modeling

Exhibit Hall B/C

The Impact Fining Process

Bappadiya Banerjee, State University of New York, Binghamton; Peter A. Engel, State University of New York, Binghamton

Formation of Oscillation Marks on Continuously Cast Steel

Paul Wilmott, University of Oxford, United Kingdom

Rank Analysis in Underwater Tracking

Frank O'Brien, United States Naval Underwater Systems Center; Marcus L. Graham, United States Naval Underwater Systems Center; Kai F. Gong, United States Naval Underwater Systems Center

Numerical Simulation of the Interaction between Gas Flows and Electric Arcs in Circuit Breakers

Pierre Baras, Université de Savoie, France; Pierre Chénier, Merlin Gerin, France

Experimental and Mathematical Approaches to Nonpropagating Solitary Waves

Jingquan Xiang, Shanghai Jiaotong University, Peoples Republic of China; Hongnong Cui, Xiangtan University, Peoples Republic of China; Jianfei Mu, Shanghai Jiaotong University, Peoples Republic of China

Vibrodiagnostics of the Disbalance Characteristics of the Deformable Rotor

Yu. L. Menshikov, State University of Dnepropetrovsk, USSR

Theories for Design and Modeling of Turbine and Fan Processes

Anthony E. Okoro, UMIST, England

Numerical Optimization of a Power Prediction Technique for Nuclear Reactor Safety Calculations

V. Colombo, Politecnico di Torino, Italy; P. Ravetto, Politecnico di Torino, Italy; P. Baratella, Politecnico di Torino, Italy

Comparison of Relative Merits of Different Strategies in Charging of Crystallizers

S.P. Mukherjee, Indian Statistical Institute, India

Modeling of Transmission Tubes

P.M. Lynch, ICI Explosives, United Kingdom; D. Sutton, ICI Explosives, United Kingdom

Thermal Stability of a Reacting Fibrous Mat Containing a Solid Particle

Alan F. Jones, University of Manchester, United Kingdom

A Concept and a Computer AI Model for Operation of a Solid/Liquid Separator System

Anthony E. Okoro, UMIST, England

Modeling the Chrome Tanning of Skins—An Analysis of Reaction and Diffusion with Variable Diffusivity

P.R. Patnaik, Institute of Microbial Technology, India

Event Based Simulation of Peat Production

Kari T. Hillebrand, Technical Research Centre of Finland, Finland

Mathematical Modelling as a Human Activity

A.O. Moscardini, Sunderland Polytechnic, United Kingdom; P. Smith, Sunderland Polytechnic, United Kingdom

Mathematical Design in the Manners X-ray Camera

Anthony G. Shannon, University of Technology, Australia; Richard L. Ollerton, University of Western Sydney, Australia

The Dynamics of the Continuous System Model in Railway Branches Testing Bearing

Wieslaw Szafranski, Warsaw University of Technology, Poland

An Analysis of Sensitivity of Multidimensional Mechanical Systems

Wieslaw Bajon, Warsaw University of Technology, Poland; Wieslaw Szafranski, Warsaw University of Technology, Poland; Włodzimir Choromanski, Warsaw University of Technology, Poland

Natural Systems Simulation: From Game To Parallel Computer

Vladimir A. Bromnikov, Leningrad University, U.S.S.R.; Andrew I. Adamazky, Leningrad University, U.S.S.R.; Sergey F. Ivanov, Leningrad University, U.S.S.R.; Michael V. Solov'yev, Leningrad University, U.S.S.R.

Parallel Processor for Simulation

Serge F. Ivanov, Leningrad University, U.S.S.R.

ICIAM 91, July 8-12, 1991

Side 1

For Contributors to Contributed Paper Sessions and Minisymposia

Contributed Presentations—Poster Form

The ICIAM 91 Program Committee is encouraging contributors to present their papers in poster form to increase communications among participants, foster the development of international friendships, and reduce the need for large numbers of parallel sessions.

Poster presentations foster the exchange of ideas between the contributor and those who have a specific interest in the contributor's work. They enable the contributor to proceed at a pace consistent with the interests of the group gathered around him/her.

Contributors selected for a session will be located together in one room according to subject matter.

Poster presentations should be based on displayed materials. A concise statement of the problem and the

results should be a conspicuous part of the display. The display should be designed to take advantage of the fact that the presentation need not be "linearly ordered" as in a talk or written paper. For example, arrows directing the viewer to various parts of the display and color coding of different aspects of the work may be used to advantage.

Each contributor will have a space approximately eight feet square and should be available for a two or three hour session. Contributors should use visual aids such as 8 1/2" x 11" sheets for mounting on a poster board approximately 4' x 6'.

Contributed Presentations—Lecture Form

Contributed papers are 15 minutes long with five additional minutes for questions and answers. To the extent possible, contributed papers will be organized into

Minisymposium Presentations

Speakers in minisymposium sessions also should complete this form. Presentations normally are 25-30 minutes each, but this must be confirmed by your minisymposium organizer.

sessions according to subject matter. Each speaker has an obligation to make himself/herself known to the chairperson at the beginning of the session.

For Users of Overhead and 35mm Projectors

Please prepare vugraphs and slide transparencies carefully. The contents should be confined to the principal points of the presentation, using 8-12 lines per transparency. Use clear, large handwriting or large typeset letters to ensure clarity. Avoid the use of many equations—a full screen of equations can lose the audience.

PLEASE ANSWER THE FOLLOWING

1. Type of Presentation (check one):

Contributed: Lecture Form _____
Poster Form

Minisymposium: _____

2. Equipment for Visual Support

Lecture Form/Minisymposium:

Overhead Projector _____

2" x 2" Slide Projector (35mm) _____

Poster Form:

Easel _____ Poster Board

Other (specify) _____

More sophisticated equipment can be provided, but you may be required to pay the rental fee. For details, indicate your requirements below:

3. If you are a speaker in a minisymposium, who is the organizer? _____

4. What is the minisymposium title? _____

5. If more than one author, who will present the paper? _____

6. Is the presentation about an industrial problem? Yes No _____

7. Subject Classification

To help us schedule your presentation, please complete Subject Classification below.

8. Society Memberships

GAMM _____ IMA _____ SIAM _____ SIMAI _____
SMAI _____ OTHER _____

SIAM SUBJECT CLASSIFICATION

(Check at least one subject, but no more than one in each group, to best describe your presentation.)

GROUP 1

- Linear algebra and matrix theory. (01)
- Real and complex analysis including approximation theory, integral transforms (including Fourier series and wavelets), integral equations, asymptotic methods, and special functions. (02)
- Functional analysis and operator equations, and integral and functional equations. (26)
- Ordinary differential equations including dynamical systems. (03)
- Partial differential equations including inverse problems. (04)
- Discrete mathematics and graph theory, including combinatorics, combinatorial optimization, and networks. (05)
- Numerical analysis (theory). (06)
- Computer science including computer architecture, computer hardware, computational complexity, applied logic, database, symbolic computation. (08)
- Applied probability including stochastic processes, queueing theory, and signal processing. (09)
- Statistics including data analysis and time series analysis. (10)

- Optimization theory and mathematical programming including discrete and numerical optimization, and linear and nonlinear programming. (12)

GROUP 2

- Control and systems theory including optimal control. (11)
- Management sciences including operations research. (27)
- Communication theory including information theory and coding theory. (13)
- Applied geometry including computer-aided design and related robotics. (14)
- Image processing including computer graphics, computer vision, related robotics, and tomography. (15)
- Classical mechanics of solids including elasticity, structures and vibrations, constitutive models. (16)
- Fluid mechanics including turbulence, aeronautics, multiphase flow. (17)
- Atmospheric and oceanographic sciences. (20)
- Quantum physics, statistical mechanics, and relativity. (18)

- Geophysical sciences including reservoir modeling, seismic exploration, and petroleum engineering. (19)
- Chemical kinetics, combustion theory, thermodynamics, and heat transfer. (21)
- Astronomy, planetary sciences, and optics. (29)
- Materials science, polymer physics, structure of matter. (31)
- Electromagnetic theory, semiconductors, and circuit analysis. (32)
- Biological sciences including biophysics, biomedical engineering and biomathematics. (22)
- Environmental sciences. (23)
- Economics. (24)
- Social sciences. (25)

GROUP 3

- Computational mathematics including scientific computing, parallel computing, and algorithm development. (07)
- Simulation and Modeling. (30)
- Applied mathematics education (K-12, undergraduate curriculum, graduate study and modeling courses). (28)
- Other

Preparation of Abstracts

- 1. Begin typing the abstract title, text, and author information directly below the heading captions.
2. Abstract should not exceed 100 words. Please:
- Explain what problem area you will address and why it is important (2-3 sentences).
- Indicate current methods used to solve the problem(s), their shortcomings and possible improvements (2-3 sentences).
- Describe the scope of your presentation.
References, if necessary, should be in the body of the abstract. Formulas should be kept to a minimum—please, no vertical fractions, multiple subscripts, or handwritten symbols. Abstracts submitted on this form will be printed as received. Errors in the text are the author's responsibility.
3. For two or more authors with the same affiliation and address, type affiliation and address directly below the authors' names.
4. Please answer all questions on the reverse side of this form.

Ways to Submit Abstracts

- 1. Electronically
A. In TeX or LaTeX via e-mail.
Macros are available in LaTeX or TeX to format your submission. Ask SIAM via e-mail (iciam@wharton.upenn.edu) to send you macros (if you have access to e-mail).
B. Via e-mail
Follow all preparation instructions as above. Submit to iciam@wharton.upenn.edu. Please answer all questions on the reverse side of this form.
2. Hard Copy—please use this form if possible
A. Use 10-12 point size type.
B. Type your abstract (up to 100 words), or use a letter quality printer, on this form or the equivalent in a space of width 4 1/4".
C. All lines are to be flush left, single-spaced within the space designated. See enclosed sample.
D. Abstract title should be in upper and lower case type. Capitalize the first letter of all words, except articles, prepositions and conjunctions.

ABSTRACT FORM

Please read instructions carefully before entering the information.

TITLE

Complex Boundary Elements for Contaminant Transport Studies

ABSTRACT

Recent numerical advances in the Complex Variable Boundary Element Method (CVBEM) provide easier-to-use analysis procedures in the study of advection-dominated contaminant transport of conservative specie migration in a steady groundwater flow field. In this paper, the CVBEM is applied to groundwater advection contaminant transport problems, and the CVBEM numerical error is evaluated by use of the approximate boundary graphical technique. Besides providing actual solutions to many groundwater flow and advective contaminant transport problems, the CVBEM can be used to develop analytic test cases to be used in numerically calibrating other groundwater and contaminant transport numerical models for other classes of problems.

Author(s) full name(s) and address(es) including department(s) and zip code

Theodore V. Hromadka II, Associate Professor, Department of Mathematics, California State University, Fullerton, California 92634 and Director of Water Resources Engineering, Williamson and Schmid, 17782 Sky Park Boulevard, Irvine, California 92714

Author presenting paper: Ted Hromadka
Telephone: 714/261-2222 until 10/19/90 after that date
E-mail: 714/259-7900
Fax (telecopy): 714/474-9120 until 10/19/90 uncertain after that date. New address as of 10/19/90 for T.V.Hromadka is Williamson and Schmid, 15101 Redhill Ave., Tustin, CA 92680

ABSTRACTS MUST BE RETURNED UNFOLDED. DEADLINE FOR SUBMITTING ABSTRACT: 92680

Send completed form to: SIAM, 3600 University City Science Center, Philadelphia, PA 19104-2688 U.S.A. e-mail: iciam@wharton.upenn.edu