ICIAM 91

SECOND INTERNATIONAL CONFERENCE ON INDUSTRIAL AND APPLIED MATHEMATICS

Abstracts

July 8 – 12, 1991 ◆ *Sheraton Washington Hotel* ◆ *Washington, D.C. USA*

ICIAM 91

ICIAM 91 Abstracts

All abstracts for ICIAM 91 presentations that were received by SIAM before May 1, 1991 are included in this book. They are arranged in alphabetical order by the last name of the presenter of the paper. You may use the ICIAM 91 final program to help you if you do not know the name of the presenter.

You can use the Program Overview on pages 3 - 5 to locate a particular session or the author index to locate an author of a paper. Once you find the entry in the program, you will find the speaker's name in italics. If only one author is listed, that person is the speaker.

On pages 249-253 of the abstract book, you will find abstracts that were received late or were inadvertently missed when the abstracts were compiled.

by Markov techniques. The essential shortcoming of Markov techniques is their inability to deal with non-Markovian invariant measures.

We show that if the invariant measure is neither determined by the past nor by the future, then it is hyperbolic. This effect is completely non-deterministic.

Hans Crauel

Fachbereich 9 MATHEMATIK
Universität des Saarlandes

6600 Saarbrücken 11

FR Germany

Artificial Intelligence Applications to Navy Logistics

Artificial intelligence techniques are currently being utilized to enhance a variety of research programs in military logistics. The Navy, in particular, is applying expert systems and neural networks to problems in areas such as diagnostics and testing.

The speaker will present specific AI applications developed for the Logistics Technology Block at David Taylor Research Center.

Carol G. Crawwford
Mathematics Department
U. S. Naval Academy
Annapolis, MD 21402-5002

Enhanced Cascaded Migration

Migration deals with an inverse problem of geophysics. It collapses by wave field extrapolation methods the surface recorded seismic data into a depth acoustic reflectivity map. The upward compressional waves travel with velocity dependent on local density and pressure parameters of the medium. On the other hand, the Stolt method solves exactly acoustic wave migration only with constant wave velocity, but it is unable to take into account lateral velocity variations. This work shows the possibility of solving this point, merging general Stolt scheme (cascaded migration) with a space-frequency method. A physically accurate and computationally effective parallel algorithm is presented here, and some results of an implementation for a supercomputer are presented.

Alessandro Crise and Guido Crispi
Osservatorio Geofisico Sperimentale
P.O. Box 2011
34016 Trieste
Italy

Model of a Liquid Jet Evolving with Time

Such a jet arises in the formation of jet droplets when surface water waves break under the influence of a strong wind. The ultimate goal is to study the disintegration of the jet and the transport of the droplets as a mechanism for energy transfer from the wind to water.

Most of the past work concerns the perturbation of infinite circular jets, which would be inappropriate here.

Longuet-Higgins (JFM, 1975) developed a theory for a two-dimensional progressive jet neglecting gravity. The present paper uses his approach for an axisymmetric jet, the effect of gravity being included.

Anthony J. Croft
Department of Mathematics
Coventry Polytechnic
Coventry, England

Identifying the Conductivity of a One-dimensional Medium from Time Averaged and Undersampled Potential Data

The identification of coefficients appearing in differential equations has been extensively considered before. The direct problem we refer to is a two point initial BVP for a linear parabolic PDE in one spatial dimension. Our inverse problem (IP) consists of identifying the position dependent conductivity from potential data. Given the existence of a solution to the IP, we provide the weak counterpart of Kitamura and Nakagiri' s [1977] uniqueness conditions and of the IP solution method due to Ponzini and Crosta [1988]. We first average the original PDE over time, then replace said average by the arithmetic mean of potential values, in order to model data undersampling. In both cases we provide uniqueness conditions and stability estimates of the Gronwall–Bellmann type, which we apply to analytical and numerical examples.

Kitamura S, Nakagiri S, 1977, *SICON*, **15**, pp 785 – 802.
Ponzini G, Crosta G, 1988, *Transport in Porous Media*, **3**, 415–436.

Giovanni Crosta
Universita' degli Studi di Milano
Dipartimento di Scienze dell' Informazione
9 via Moretto da B., I 20133 MILAN (IT)

A FOCUS Case Study: The Design and Construction of a Knowledge-Based Library Routine Advisor

During the past two decades there has been a steady growth in the range of mathematical software available, and current libraries of mathematical routines contain a wide range of quality software, which represents an immense body of tested implementations of efficient algorithms. There is a widely perceived need to provide assistance in the use of such libraries, because the very breadth of choice makes selection of the best routine difficult and also because an increasing number of users wish to solve their problems without becoming embroiled in the technicalities of specific software. In this talk we show how the generic tools emerging from the FOCUS project have been used to create a knowledge-based front end (KBFE) for a large mathematical library. The KBFE provides assistance to the user, including assistance in the choice of a suitable routine, assistance in the use of a selected routine, and background mathematical information.

Colin W. Cryer
Westfaelische Wilhelms-Universitaet, Muenster, Germany

Design of transparent boundary conditions for the wave equation in two and three dimensions by using the Kirchhoff formula.

The Kirchhoff formula for the wave equation in three dimensions gives perfectly transparent (non local) conditions for arbitrary artificial boundary. This elementary result has not been noted in the current literature. We show that this formula allows some improvements in the approximated transparent conditions at corners of artificial boundaries and, for particular geometries, at corners where the kind of boundary condition changes (transition from transparent to homogeneous Dirichlet or Neumann conditions). We show also that convenient approximations of the Kirchhoff formula give the Engquist Majda conditions of order 1 and 2 in the cases of a two dimensionnal half space and of a three dimensionnal axial symmetric problem.

Michel CUER
Laboratoire de Physique Mathématique
Université de Montpellier II
Sciences et Techniques du Languedoc
Case Courrier n°050
Place Eugène Bataillon
34095 Montpellier Cedex 2
Telephone: 67-14-35-64
Fax: 67-54-30-79
e-mail : lincuer @ frmop11 (bitnet)

Heat Conduction from a VLSI Chip

A recent Mathematics Clinic project concerned a heat transfer problem from the semi-conductor industry. Increase in current densities due to