

Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

2669

Springer

Berlin

Heidelberg

New York

Hong Kong

London

Milan

Paris

Tokyo

Vipin Kumar Marina L. Gavrilova
Chih Jeng Kenneth Tan Pierre L'Ecuyer (Eds.)

Computational Science and Its Applications – ICCSA 2003

International Conference
Montreal, Canada, May 18-21, 2003
Proceedings, Part III



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany
Juris Hartmanis, Cornell University, NY, USA
Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

Vipin Kumar
Army High Performance Computing Research Center, USA
University of Minnesota
Department of Computer Science and Engineering, MN 55455, USA
E-mail: kumar@cs.umn.edu

Marina L. Gavrilova
University of Calgary
Department of Computer Science, Calgary, AB, T2N1N4, Canada
E-mail: marina@cpsc.ucalgary.ca

Chih Jeng Kenneth Tan
Heuchera Technologies Inc.
122 9251-8 Yonge Street, Richmond Hill, ON, Canada L4C 9T3
The Queen's University of Belfast
School of Computer Science, Belfast BT7 1NN, Northern Ireland, UK
E-mail: cjtan@OptimaNumerics.com

Pierre L'Ecuyer
Université de Montréal
Département d'informatique et de recherche opérationnelle
Montréal, Québec, H3C 3J7, Canada
E-mail: lecuyer@iro.umontreal.ca

Cataloging-in-Publication Data applied for

A catalog record for this book is available from the Library of Congress.
Bibliographic information published by Die Deutsche Bibliothek
Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie;
detailed bibliographic data is available in the Internet at <<http://dnb.ddb.de>>.

CR Subject Classification (1998): D, F, G, H, I, J, C.2-3

ISSN 0302-9743

ISBN 3-540-40156-3 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York
a member of BertelsmannSpringer Science+Business Media GmbH

<http://www.springer.de>

© Springer-Verlag Berlin Heidelberg 2003
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Boller Mediendesign
Printed on acid-free paper SPIN: 10927441 06/3142 5 4 3 2 1 0

Preface

Computational Science is becoming a vital part of many scientific investigations, impacting researchers and practitioners in areas ranging from aerospace and automotive to chemistry, electronics, geosciences, finance, mathematics, and physics. Due to the sheer size of many challenges in computational science, the use of supercomputing, parallel processing, and sophisticated algorithms is inevitable.

This volume contains the proceedings of The 2003 International Conference on Computational Science and Its Applications (ICCSA 2003), held in Montreal, Canada in May 2003. The papers presented here reflect the aim of the program committee to bring together researchers and scientists from mathematics and computer science, the basic computing disciplines, and researchers from various application areas who are pioneering advanced application of computational methods to sciences such as physics, chemistry, life sciences, engineering, arts, and the humanities, along with software developers and vendors, to discuss problems and solutions in the area, identify new issues, and shape future directions for research, as well as help industrial users apply various advanced computational techniques.

Our outstanding invited speakers outlined the theme for the Conference, considering sophisticated numerical computational methods, emerging computational solutions, and problems and applications pushing the bounds of advanced computing techniques and hardware.

This Conference was held as the first in its series, with an emphasis on Computational Science and the application of computational science. Interest from researchers and practitioners in this interdisciplinary area has been overwhelming, and we are looking forward to future events in this Conference series.

The ICCSA 2003 Conference was jointly organized by (in alphabetical order): Heuchera Technologies, Canada, The Queen's University of Belfast, UK, SHARCNET, Canada, University of Calgary, Canada, University of Minnesota, USA, and University of Montreal, Canada.

ICCSA 2003 would not have been possible without the support of our sponsors (in alphabetical order):

- CERCA, Canada
- IBM Canada, Canada
- IBM, USA
- Heuchera Technologies, Canada
- Pallas, Germany
- The Queen's University of Belfast, UK
- SHARCNET, Canada
- Society for Industrial and Applied Mathematics, USA
- Springer-Verlag, Germany

- School of Computer Science, The Queen's University of Belfast, UK
- Department of Computer Science, University of Calgary, Canada

The support provided by these sponsors was beyond our expectations.

We would also like to mention the following individuals who have greatly supported us (in alphabetical order):

- Hamid Arabnia (University of Georgia, USA)
- Michael Bauer (SHARCNET, Canada)
- Matthew Dixon (Heuchera Technologies, Canada)
- Anna Kramer (Springer-Verlag, Germany)
- Dominic Lam (IBM Canada, Canada)
- Alfred Hofmann (Springer-Verlag, Germany)
- Andres Iglesias (University de Cantabria, Spain)
- Allan MacIsaac (SHARCNET, Canada)
- Youngsong Mun (Soongsil University, Korea)
- Colette Tipping (The Queen's University of Belfast, UK)
- Birgit Wissen (Pallas, Germany)

We are deeply indebted to the members of the program committee and all people in the community who have helped us to form a successful program. Many individuals have kindly offered us their assistance and support in the organization of this Conference. If we have failed to thank them, we would like to ask them to accept our sincere apologies.

May 2003

Vipin Kumar
Marina L. Gavrilova
C.J. Kenneth Tan
Pierre L'Ecuyer

Conference Organization

Conference Chairs

Honorary Chair:

Vipin Kumar (Army High Performance Computing Center, USA, and University of Minnesota, USA)

Conference Chairs:

Marina Gavrilova (University of Calgary, Canada)

C.J. Kenneth Tan (Heuchera Technologies, Canada, and The Queen's University of Belfast, UK)

Local Organizing Chair:

Pierre L'Ecuyer (University of Montreal, Canada)

International Steering Committee

Michael Bauer (SHARCNET, Canada)

J.A. Rod Blais (University of Calgary, Canada)

Alexander V. Bogdanov (Institute for High Performance Computing and Data Bases, Russia)

Marina L. Gavrilova (University of Calgary, Canada)

Andres Iglesias (University de Cantabria, Spain)

Benjoe A. Juliano (California State University at Chico, USA)

Vipin Kumar (Army High Performance Computing Center, USA, and University of Minnesota, USA)

Reneé S. Renner (California State University at Chico, USA)

C.J. Kenneth Tan (Heuchera Technologies, Canada, and The Queen's University of Belfast, UK)

Jerzy Wasniewski (Danish Computing Center for Research and Education, Denmark)

Program Committee

Sergei Bespamyatnikh (Duke University, USA)

J.A. Rod Blais (University of Calgary, Canada)

Alexander V. Bogdanov (Institute for High Performance Computing and Data Bases, Russia)

Marian Bubak (AGH, Poland)

Toni Cortes (Universidad de Catalunya, Barcelona, Spain)

Brian J. d'Auriol (University of Texas at El Paso, USA)

Ovidiu Daescu (University of Texas at Dallas, USA)
Frank Dehne (Carleton University, Canada)
Tamal Dey (Ohio State University, USA)
Ivan Dimov (Bulgarian Academy of Sciences, Bulgaria)
Matthew F. Dixon (Heuchera Technologies, Canada)
Geoffrey Fox (Indiana University, USA)
Marina L. Gavrilova (University of Calgary, Canada)
Christopher Gold (Hong Kong Polytechnic University)
Bob Hertzberger (Universiteit van Amsterdam, The Netherlands)
Andres Iglesias (University de Cantabria, Spain)
Chris Johnson (University of Utah, USA)
Benjoe A. Juliano (California State University at Chico, USA)
Deok-Soo Kim (Hanyang University, Korea)
Vipin Kumar (Army High Performance Computing Center, USA, and University of Minnesota, USA)
Antonio Lagana (Università degli Studi di Perugia, Italy)
Michael Mascagni (Florida State University, USA)
Cathy McDonald (Department of Defense HPC Modernization Program, USA)
Graham Megson (University of Reading, UK)
Jiri Nedoma (Academy of Sciences of the Czech Republic, Czech Republic)
Robert Panoff (Shodor Education Foundation, USA)
Ron Perrott (The Queen's University of Belfast, UK)
Renée S. Renner (California State University at Chico, USA)
Vaclav Skala (University of West Bohemia, Czech Republic)
Kokichi Sugihara (University of Tokyo, Japan)
David Taniar (Monash University, Australia)
Ruppa K. Thulasiram (University of Manitoba, Canada)
Koichi Wada (University of Tsukuba, Japan)
Jerzy Wasniewski (Danish Computing Center for Research and Education, Denmark)
Roy Williams (California Institute of Technology, USA)
Stephen Wismath (University of Lethbridge, Canada)
Osman Yasar (SUNY at Brockport, USA)
Zahari Zlatev (Danish Environmental Research Institute, Denmark)

Table of Contents, Part III

Computational and Methodological Developments in Spatial Analysis within GIS

A Variable Resolution Approach to Cluster Discovery in Spatial Data Mining	1
<i>A.J. Brimicombe</i>	
PGIS, a Software for Paleogeographic Reconstruction in ArcGIS	12
<i>S. Mei</i>	
Spatial and Temporal Autocorrelation in Innovation Diffusion Analysis ...	23
<i>S. Bertazzon</i>	
Testing Differences between Case and Control Point Patterns Using Nearest Neighbour Distances and Bootstrapping	33
<i>K.A. Henry, L.M. Burge, D. Nguyen</i>	
Assessment of Different Link Functions for Modeling Binary Data to Derive Sound Inferences and Predictions	43
<i>F. Huettmann, J. Linke</i>	

Partitioning Mesh-Based Applications for Computational Grids

Improvements to the Helpful-Set Algorithm and a New Evaluation Scheme for Graph-Partitioners	49
<i>S. Schamberger</i>	
Mesh Partitioners for Computational Grids: A Comparison	60
<i>S. Huang, E. Aubanel, V.C. Bhavsar</i>	
CONFIIT: A Middleware for Peer to Peer Computing	69
<i>O. Flauzac, M. Krajecki, J. Fugère</i>	

Internet Communications Security

On MARS's s-boxes Strength against Linear Cryptanalysis	79
<i>C.J. Hernández Castro, L.J. García Villalba, J.C. Hernández Castro, J.M. Sierra Cámara</i>	
A Secret Sharing Scheme Using Matrices	84
<i>C. Hernández-Goya, P. Caballero-Gil, C. Bruno-Castañeda</i>	

A Modular Architecture for Distributed IDS in MANET 91
*R.S. Puttini, J.-M. Percher, L. Mé, O. Camp, R. de Sousa Jr.,
C.J. Barenco Abbas, L.J. García-Villalba*

Characterization of the Security Implications of Alternative E-procurement
Topologies 114
E. Ponce, A. Durán

Protection of Multiagent Systems 123
J.M. Sierra, J.C. Hernández, E. Ponce, A. Ribagorda

On the Number of Equivalence Classes in Certain Stream Ciphers 129
L.J. García-Villalba

Computational Finance

Parallelization and Vectorization of Simulation Based Option Pricing
Methods 139
J. Schumacher, U. Jaekel, A. Basermann

An Algorithm for Determining the Controllers of Supervised Entities at
the First and Second Levels: A Case Study with the Brazilian Central
Bank 148
V.G. Fracari Branco, L. Weigang, M.P. Estrela Abad, J. Denzinger

Two Factor Option Pricing with Uncertain Volatility 158
D.M. Pooley, P.A. Forsyth, K.R. Vetzal

Improved Monte Carlo Linear Solvers Through Non-diagonal Splitting 168
A. Srinivasan, V. Aggarwal

Valuation of American Options Using Direct, Linear Complementarity-
Based Methods 178
M.D. Koulisianis, T.S. Papatheodorou

Testing the Expectations Hypothesis for Interest Rate Term Structure:
Some Australian Evidence 189
V. Fang, V.C.S. Lee

A Fourth Order L -stable Method for the Black-Scholes Model with Barrier
Options 199
D.A. Voss, A.Q.M. Khaliq, S.H.K. Kazmi, H. He

Ranking Decision Variants by Subjective Paired Comparisons in Cases
with Incomplete Data 208
M. Kwiesielewicz, E. van Uden

Quantum Games and Minimum Entropy 216
E. Jiménez

Distributed Solution of High-Order Compact Difference Schemes for Multidimensional Convection-Diffusion Equations	226
<i>M.F. Dixon, K. Tan</i>	

Neural Network for Modeling Financial Time Series: A New Approach	236
<i>C. Slim, A. Trabelsi</i>	

Theme: Scientific Visualization and Image Processing

Illumination, Visualization, and Rendering

Camera Models and Optical Systems Used in Computer Graphics: Part I, Object-Based Techniques	246
<i>B.A. Barsky, D.R. Horn, S.A. Klein, J.A. Pang, M. Yu</i>	

Camera Models and Optical Systems Used in Computer Graphics: Part II, Image-Based Techniques	256
<i>B.A. Barsky, D.R. Horn, S.A. Klein, J.A. Pang, M. Yu</i>	

Moment Based Transfer Function Design for Volume Rendering	266
<i>Z. Jiawan, S. Jizhou, S. Zhigang, W. Zunce</i>	

Information-Theory-Based Oracles for Hierarchical Radiosity	275
<i>J. Rigau, M. Feixas, M. Sbert</i>	

A Hybrid Scheme for Interactive Rendering a Virtual Environment	285
<i>T.-Y. Lee, P.-H. Lin, T.-H. Yang</i>	

Fast Adaptive Selection of Best Views	295
<i>P.-P. Vázquez, M. Sbert</i>	

Perception-Based Illumination Information Measurement and Light Source Placement	306
<i>P.-P. Vázquez, M. Sbert</i>	

A Study on the Dynamic Painterly Stroke Generation for 3D Animation ..	317
<i>H.K. Lee, Y.S. Park, K.H. Yoon</i>	

A Directional Stroke Generation Algorithm for Painterly Rendering	326
<i>J.S. Cha, Y.S. Park, K.H. Yoon</i>	

A Simple Method for Ray Tracing Diffraction	336
<i>E. Agu, F.S. Hill Jr.</i>	

A Multiple Depth Buffer Implementation for Radiosity	346
<i>R. Martínez, L. Szirmay-Kalos, M. Sbert</i>	

Geometry, Modeling, and Computer-Aided Geometric Design

Solving Geometric Constraints Invariant Modulo the Similarity Group	356
<i>É. Schramm, P. Schreck</i>	
Triangular Bézier Surfaces of Minimal Area	366
<i>A. Arnal, A. Lluch, J. Monterde</i>	
Projection Filling Based on Contour Structural Points	376
<i>D. Yu, H. Dong, W. Lai, Y. Yang</i>	
A Graph Based Algorithm for Intersection of Subdivision Surfaces	387
<i>S. Lanquetin, S. Foufou, H. Kheddouci, M. Neveu</i>	
Implicit Polynomial Support Optimized for Sparseness	397
<i>I.Z. Emiris, I.S. Kotsireas</i>	
“CONTOUR” Algorithm for Finding and Visualizing Flat Sections of 3D-Objects	407
<i>D.V. Mogilenskikh</i>	
A Non-uniform Binary Space Partition Algorithm for 2D Implicit Curves .	418
<i>F. Morgado, A. Gomes</i>	
Navigation, Compression, Meshes, Data Management	
Web Visualization of Function-Defined Shapes	428
<i>A. Sourin, L.F. Min, K. Levinski</i>	
Planar Subdivisions by Radical Axes Applied to Structural Morphology . .	438
<i>R. Togores, C. Otero</i>	
Distribution of Vertex Indices in Edgebreaker	448
<i>Y. Cho, D.-S. Kim, H. Kim, H.C. Lee, J.Y. Park</i>	
A Comparison Study of Modern Heuristics for Solving the Partitioning Problem in Distributed Virtual Environment Systems	458
<i>P. Morillo, M. Fernández, J.M. Orduña</i>	
Optimal Exploitation of Client Texture Hardware Capabilities on a Client-Server Remote Visualization Framework	468
<i>I. Boada, I. Navazo</i>	
AIF - A Data Structure for Polygonal Meshes	478
<i>F.G.M. Silva, A.J.P. Gomes</i>	
High Dynamic Range Image Texture Mapping Based on VRML	488
<i>S.-Y. Kim, B.-T. Choi</i>	
CW Complexes: Topological Mainframe for Numerical Representations of Objects	498
<i>P. Desbarats, S. Gueorguieva</i>	

Reconstruction, Approximation, and Morphing

Approximating 3D General Sweep Boundary Using Depth-Buffer	508
<i>J. Ahn, S.J. Hong</i>	
Morphology-Based 3D Volume Metamorphosis	518
<i>T.-Y. Lee, C.-H. Lin, W.-H. Wang</i>	
Self-correctional 3D Shape Reconstruction from a Single Freehand Line Drawing	528
<i>B.S. Oh, C.H. Kim</i>	
3D Primitive Reconstruction Using the Line Segment with Single Image ..	539
<i>S.-D. Cho, S.-T. Ryoo, T.-H. Choi, K.-H. Yoon</i>	
CIGRO: A Minimal Instruction Set Calligraphic Interface for Sketch-Based Modeling	549
<i>M. Contero, F. Naya, J. Jorge, J. Conesa</i>	

Computer Art: Computer Graphics Applications

MOTRICO Project: Geometric Construction and Mesh Generation of Blood Vessels in Coronary Bifurcation	559
<i>F.J. Seron, E. Garcia, J. del Pico</i>	
Analysis Tool for Cataloguing Textile and Tile Pattern Designs	569
<i>M. Valor, F. Albert, J.M. Gomis, M. Contero</i>	

Animation and Motion

Urban Site Modeling from LiDAR	579
<i>S. You, J. Hu, U. Neumann, P. Fox</i>	
An Automatic Outline Fitting Algorithm for Arabic Characters	589
<i>M. Sarfraz, M.A. Khan</i>	
Hardware-Accelerated Real-Time Rendering for 3D Sumi-e Painting	599
<i>S.-J. Kang, S.-J. Kim, C.-H. Kim</i>	
Generation of Symmetrical Patterns Based on Text and Colour	609
<i>A. Salman, R. Salman, E. Love</i>	
Reuse of Motion Capture Data in Animation: A Review	620
<i>W. Geng, G. Yu</i>	
A Real-Time Natural Motion Edit by the Uniform Posture Map Algorithm	630
<i>J.O. Kim, B.R. Lee, C.H. Chung</i>	

A Feature-Preserved Simplification for Autonomous Facial Animation from
3D Scan Data 640
S.-K. Kim, S.-J. Kim, C.-H. Kim

Human Motion Tracking by Combining View-Based and Model-Based
Methods for Monocular Video Sequences 650
J. Park, S. Park, J.K. Aggarwal

Animating Behavior of Virtual Agents: The Virtual Park 660
F. Luengo, A. Iglesias

**Computer Aided Design and Computer Aided
Manufacturing**

A Curve Design Method with Shape Control 670
M. Sarfraz, M. Balah

Determination of Cutting Direction for Minimization of Tool Retraction
Length in Zigzag Pocket Machining 680
B.K. Kim, J.Y. Park, H.C. Lee, D.-S. Kim

Digital Styling for Designers: Sketch Emulation in Computer
Environment 690
S.-H. Bae, W.-S. Kim, E.-S. Kwon

Digital Styling for Designers: 3D Plane-Symmetric Freeform Curve
Creation Using Sketch Interface 701
S.-H. Bae, R. Kijima, W.-S. Kim

Directional Offset of a Spatial Curve for Practical Engineering Design 711
H. Shin, S.K. Yoo, S.K. Cho, W.H. Chung

Task-Level Assembly Modeling in Virtual Environments 721
B. Jung

Design of a New Test Part for Benchmarking the Accuracy and Surface
Finish of Rapid Prototyping Processes 731
H.-S. Byun, K.H. Lee

Automated Scan Plan Generation Using STL Meshes for 3D Stripe-Type
Laser Scanner 741
S. Son, K.H. Lee

An Efficient Algorithm for Real-Time 3D Terrain Walkthrough 751
M. Hesse, M.L. Gavrilova

Computational Geometry and Applications

Geometric Graphs for Improving Nearest Neighbor Decision Rules 762
G. Toussaint

Red-Blue Separability Problems in 3D	766
<i>F. Hurtado, C. Seara, S. Sethia</i>	
Two-Dimensional Range Search Based on the Voronoi Diagram	776
<i>T. Kanda, K. Sugihara</i>	
Computing a Closest Point to a Query Hyperplane in Three and Higher Dimensions.....	787
<i>P. Mitra, A. Mukhopadhyay</i>	
Computing a Largest Empty Arbitrary Oriented Rectangle: Theory and Implementation	797
<i>A. Mukhopadhyay, S.V. Rao</i>	
An Approximate Morphing between Polylines	807
<i>S. Bespamyatnikh</i>	
Efficient Proximity Search for 3-D Cuboids	817
<i>J. Gao, R. Gupta</i>	
An Explicit Solution for Computing the Euclidean d -dimensional Voronoi Diagram of Spheres in a Floating-Point Arithmetic	827
<i>M.L. Gavrilova</i>	
Dynamically Maintaining a Hierarchical Planar Voronoi Diagram Approximation	836
<i>I. Boada, N. Coll, J.A. Sellarès</i>	
Voronoi Diagram of Circles in a Large Circle	847
<i>D.-S. Kim, D. Kim, K. Sugihara</i>	
On Estimating Result Sizes of Multi-way Spatial Joins.....	856
<i>H.-H. Park</i>	
The Integer Hull of a Convex Rational Polytope	866
<i>J.B. Lasserre</i>	
Straight-Line Drawings of General Trees with Linear Area and Arbitrary Aspect Ratio	876
<i>A. Garg, A. Rusu</i>	
Connected Guards in Orthogonal Art Galleries	886
<i>V. Pinciu</i>	
Four Colouring the Vertices of the Triangulation of a Polygon Containing a Hole	894
<i>G.M. Seed, D.E.R. Clark, R. Ocone, X.Y. Yang</i>	
Partitioning Polygons into Tree Monotone and Y -monotone Subpolygons .	903
<i>R.P. Boland, J. Urrutia</i>	

Finding Coarse Grained Parallelism in Computational Geometry
Algorithms 913
 V. Beletsky

On the Reliability of Triangle Intersection in 3D 923
 S. Robbins, S. Whitesides

A Parametrically-Optimized Morphing Scheme of Polygonal Meshes 931
 J. Shen

Author Index 941

Table of Contents, Part I

Invited Paper

Random Number Generators with Period Divisible by a Mersenne Prime . .	1
<i>R.P. Brent, P. Zimmermann</i>	

Scientific Visualization

Visualizing Large Relational Datasets by Combining Grand Tour with Footprint Splatting of High Dimensional Data Cubes	11
<i>L. Yang</i>	

Visualizing Frequent Itemsets, Association Rules, and Sequential Patterns in Parallel Coordinates	21
<i>L. Yang</i>	

Information Extraction to Generate Visual Simulations of Car Accidents from Written Descriptions	31
<i>P. Nugues, S. Dupuy, A. Egges</i>	

Interactive Stereoscopic Visualization of Very Large Visible Men on CAVE	41
<i>I. Ihm, B. Lee, J.-Y. Lee, M. Joh, S. Park</i>	

Panoramic Spherical Video – The Space Ball	51
<i>J.E. Coleshill, A. Ferworn</i>	

Human Expressions Interaction Between Avatar and Virtual World	59
<i>R. Liang, C. Chen, Z. Pan, J. Bu</i>	

Image Processing

Progressive Curve Representation Based on Reverse Subdivision	67
<i>F.F. Samavati, M.A. Nur, R. Bartels, B. Wyvill</i>	

Concept-Based Image Retrieval Using the New Semantic Similarity Measurement	79
<i>J. Choi, M. Cho, S.H. Park, P. Kim</i>	

Case- and Rule-Based Algorithms for the Contextual Pattern Recognition Problem	89
<i>M. Wozniak</i>	

A Simple Algorithm for Object Location from a Single Image without Camera Calibration	99
<i>M. Bénallal, J. Meunier</i>	

Spatial Enhancement of Digital Terrain Model Using Shape from Shading with Single Satellite Imagery	105
<i>M.A. Rajabi, J.A.R. Blais</i>	

Robust Real-Time Face Tracking and Modeling from Video	114
<i>R. Liang, C. Chen, Z. Pan, J. Bu</i>	

Computer, Mobile, and Data Networks

Prediction Mechanism for Accessing Web Sites for Mobile Clients	124
<i>G. González S., R.A. Pazos R., V.J. Sosa S.</i>	

Adaptive and Scalable Allocation of Data-Objects in the Web	134
<i>J. Pérez O., R.A. Pazos R., D. Romero, R. Santaolaya S., G. Rodríguez O., V. Sosa S.</i>	

Intelligent Fault-Tolerant Web Caching Service on Application Level Active Networks	144
<i>S. Hong, K. Kim, S. Han</i>	

Dynamic Clustering of Web Search Results	153
<i>L. Yang, A. Rahi</i>	

A Resilient Web Caching Architecture	160
<i>V.J. Sosa Sosa, G. González S., L. Navarro, J. Pérez O.</i>	

A Context-Based Information Agent for Supporting Education on the Web	170
<i>M. Abdel Razek, C. Frasson, M. Kaltenbach</i>	

The Two-Criteria Topological Design Problem in WAN with Delay Constraint: An Algorithm and Computational Results	180
<i>M. Gola, A. Kasprzak</i>	

Mobile IPv6 Fast Handover Mechanism in Wireless LAN with Several Access Routers	190
<i>P.S. Kim, J.H. Lee</i>	

Symmetrical Declustering: A Load Balancing and Fault Tolerant Strategy for Clustered Video Servers	199
<i>S. Wu, H. Jin, G. Tan</i>	

Efficient and Fast Discovery of Slave Home Agent's Address in Mobile IPv6	209
<i>P.S. Kim, Y.K. Kim</i>	

Adaptive Information Exchange with Field Bus Systems	217
<i>S. Eberle, P. Göhner</i>	
A Replication Protocol with Composite Topology for High Adaptability ..	227
<i>S.C. Choi, H.Y. Youn, J.K. Park, J.S. Choi</i>	
How Secure Personal Mobility Can Be?	238
<i>S. Vincze</i>	
Algorithms and Applications	
Generation of Valid Labeled Binary Trees	245
<i>B. Effantin</i>	
Scheduling Intervals Using Independent Sets in Claw-Free Graphs	254
<i>D.R. Gaur, R. Krishnamurti</i>	
A Novel Approach to Optimal Packing Using Composite Object Geometry	263
<i>M.M. Atiqullah, E.M. Crespo</i>	
A Discrete Farkas Lemma	273
<i>J.B. Lasserre</i>	
Elementary Encoding by Evolutionary Approach	282
<i>I. Vasylytsov</i>	
An Efficient Algorithm for the Compression of Time-Dependent Data from Scientific Simulations	291
<i>C. Li, P.E. Plassmann</i>	
Rate Control for Low Bit Rate Video via Enhanced Frame Skipping	302
<i>J.-Y. Pyun, Y. Kim, S.-J. Ko</i>	
Automatic Object-Based Video Segmentation Using Distributed Genetic Algorithms	312
<i>E.Y. Kim, S.H. Park</i>	
3D Protein Peptide Chain Search Using an Improved Genetic Algorithm ..	322
<i>Z. Yang, G. Liu</i>	
Efficient Inversion Algorithm for Optimal Normal Bases Type II	330
<i>H.S. Yoo, E.S. Kim</i>	
Dual Space Drawing Methods of Cylinders	338
<i>R. Ding</i>	
Implementation of Smartcard Using Multi Authentication Method	348
<i>S.-E. Lee, H.-J. Jang, S.-Y. Han</i>	

Textual CBR for Incident Report Retrieval 358
*D.C. Wilson, J. Carthy, K. Abbey, J. Sheppard, R. Wang, J. Dunnion,
A. Drummond*

The Integral Dictionary: A Lexical Network Based on Componential
Semantics 368
D. Dutoit, P. Nugues, P. de Torcy

Classification Methods Using Neural Networks and Partial Precedence
Algorithms for Differential Medical Diagnosis: A Case Study 378
A.F. Kuri-Morales, M.R. Ortiz-Posadas

Consistent and Efficient Density Estimation 388
H. Hendriks, P.T. Kim

Investigation of Geometric Shapes of Hydrodynamic Structures for
Identification of Dynamical States of Convective Liquid 398
A.M. Krot, P.P. Tkachova

Restoration of Dynamical Systems Attractors and Estimation of Their
Geometric Characteristics into State-Space 407
A.M. Krot, H.B. Minervina

Parallel Genetic Algorithms for the Tuning of a Fuzzy AQM Controller .. 417
G. Di Fatta, G. Lo Re, A. Urso

New Robust Algorithm for Nonlinear Robot Systems 427
J.-G. Kim, K.h. Park

Knowledge Representation and Artificial Intelligence

Scalable Knowledge Discovery in Point-to-Multipoint Environments 437
S. Cho

Knowledge Grid Support for Treatment of Traumatic Brain Injury
Victims 446
P. Brezany, A.M. Tjoa, M. Rusnak, J. Brezanyova, I. Janciak

Neural Based Approach to Keyword Extraction from Documents 456
T. Jo

Intelligent Crowd Simulation 462
L. Feng, R. Liang

Simulation and Modeling

Parallel Coupled Thermomechanical Simulation Using Hybrid Domain
Decomposition 472
P.A. Adamidis, M.M. Resch

Three Dimensional Modelling of Combustion in a Direct Injection Diesel Engine Using a New Unstructured Parallel Solver	483
<i>J. Bohbot, M. Zolver, D. Klahr, A. Torres</i>	
Computational Modelling of Particle Degradation in Dilute Phase Pneumatic Conveyors.....	493
<i>P. Chapelle, N. Christakis, H. Abou-Chakra, U. Tuzun, I. Bridle, M.S.A. Bradley, M.K. Patel, M. Cross</i>	
Simulation of Chemical Reaction Fronts in Anaerobic Digestion of Solid Waste	503
<i>H.J. Eberl</i>	
Numerical Studies of Turbulent Jet Hydrogen/Air Diffusion Flames with Local Quenching Using Stiff Complex Chemistry	513
<i>X. Zhou, D.L. Hitt</i>	
Computational Modeling of Geophysical Systems	523
<i>S. Davenport, P. Seshaiyer</i>	
Modeling and Simulation of an Experimental Manufacturing Cell	533
<i>N. Rakoto-Ravalontsalama, J.L. Villa</i>	
A Study of Three-Dimensional Preferential Flow Using a Web-Based Simulation System	539
<i>V.J. Alarcon, H. Zeng, W. Kingery, H.M. Selim, J. Zhu</i>	
Mathematical Modeling of Crown Forest Fires Initiation	549
<i>V. Perminov</i>	
Numerical Simulation of Free Surface MHD Flows: Richtmyer - Meshkov Instability and Applications	558
<i>R. Samulyak, J. Glimm, W. Oh, H. Kirk, K. McDonald</i>	
Parallel Computing for Semiquantal Few-Body Systems in Atomic Physics	568
<i>R.A. Sultanov, D. Guster</i>	
Modelling Traffic Flow at a Multilane Intersection.....	577
<i>R. Wang, H.J. Ruskin</i>	
Some Recent Results on a Domain Decomposition Method in Biomechanics of Human Joints	587
<i>J. Nedoma, I. Hlaváček, J. Daněk, P. Vavřík, J. Stehlík, F. Denk</i>	
The Design and Implementation of Chinese Question and Answering System	601
<i>I-H. Meng, W.-P. Yang</i>	

Computational Aspects of Data Mining 614
F.A. Mărginean

Dynamic System Design for the Scrap-Processing Problem under JIT 623
J. Ding, R. Karunamuni

Extracting Motion Model Parameters with Robust Estimation 633
S.-W. Jang, M. Pomplun, G.-Y. Kim, H.-I. Choi

A Scientific On-line Database for Efficient Function Approximation..... 643
I. Veljkovic, P.E. Plassmann, D.C. Haworth

Programming Methods in Computer Simulation

Return of an Object in Two-Stack Dynamic Memory 654
G. Bassen, I. Garber

Programming in a High Level Approach for Scientific Computing 663
B. Ge

A Method to Evaluate Computational Programs Using the Logical
Combinatorial Approach 674
M.R. Ortiz-Posadas, R.L.S. Dazzi, M. Nazaré M.A. Hahne

The Efficient Debugging System for Locating Logical Errors in Java
Programs 684
H.-J. Kouh, W.-H. Yoo

A New Definitional Specification Language 694
A. Redouane

Restructuring Conditional Code Structures Using Object Oriented Design
Patterns 704
R. Santaolaya S., O.G. Fragoso D., J. Pérez O., L. Zambrano S.

Explicit Surrogate Dual Formulation and Algorithm for Quadratic
Programming..... 714
Z.C. Xuan, K.H. Lee

Relationships Between Selected Software Measures and Latent Bug-Density:
Guidelines for Improving Quality 724
S.C. Misra, V.C. Bhavsar

An Analysis of Idle CPU Cycles at University Computer Labs 733
S. Hwang, K. Jeong, E. Im, C. Woo, K.-S. Hahn, M. Kim, S. Lee

Self-configuring Algorithm for Software Fault Tolerance in (n,k)-way
Cluster Systems 742
C. Choi, S. Kim

Parallel High-Level Image Processing on a Standard PC	752
<i>M.F. Ercan, Y.F. Fung</i>	

Connection Mechanism Using Agent for Streaming in Multimedia Messaging Service Environment	761
<i>J. Hong, J. Song, S. Han, K. Kim</i>	

Complex Dynamics and Financial Fragility in an Agent Based Model	770
<i>M. Gallegati, G. Giulioni, N. Kichiji</i>	

Functional Analysis

Uniform Approximations for Transcendental Functions	780
<i>S. Winitzki</i>	

Computing the Incomplete Gamma Function to Arbitrary Precision	790
<i>S. Winitzki</i>	

On Monotonic Solutions of an Integral Equation Related with the Chandrasekhar Equation	799
<i>J. Caballero, J. Rocha, K.B. Sadarangani</i>	

A Compact Scheme for the Streamfunction Formulation of Navier-Stokes Equations	809
<i>D. Fishelov, M. Ben-Artzi, J.-P. Croisille</i>	

Large Scale Computing

A Performance Comparison of Matrix Solvers on Compaq Alpha, Intel Itanium, and Intel Itanium II Processors	818
<i>C.J.K. Tan, D. Hagan, M. Dixon</i>	

The Role of Multi-method Linear Solvers in PDE-based Simulations	828
<i>S. Bhowmick, L. McInnes, B. Norris, P. Raghavan</i>	

Time-Memory Trade-Offs Using Sparse Matrix Methods for Large-Scale Eigenvalue Problems	840
<i>K. Teranishi, P. Raghavan, C. Yang</i>	

Computer Technology for Solving Large Scale Matrix Problems	848
<i>O.D. Joukov, N.D. Rishe</i>	

A Compact and Fast Division Architecture for a Finite Field $GF(2^m)$	855
<i>C.H. Kim, S. Kwon, J.J. Kim, C.P. Hong</i>	

Montgomery Multiplication and Squaring Algorithms in $GF(2^k)$	865
<i>N.-Y. Kim, K.-Y. Yoo</i>	

Time-Space Efficient Exponentiation over $GF(2^m)$	875
<i>K.-M. Ku, K.-J. Ha, K.-Y. Yoo</i>	

Efficient Architecture for Exponentiation and Division in $GF(2^m)$ Using Irreducible AOP	883
<i>W.-H. Lee, Y.-J. Heo, K.-Y. Yoo</i>	
A High-Performance UL Factorization for the Frontal Method	893
<i>M. Bianco</i>	
The p -th Order Necessary Optimality Conditions for Inequality-Constrained Optimization Problems	903
<i>O. Brezhneva, A. Tret'yakov</i>	
A Direct Method for Block-Toeplitz Systems with Applications to Re-manufacturing Systems	912
<i>W.-K. Ching, M.M. Ng, W.-O. Yuen</i>	
Reduced Fractal Analysis of the Multidimensional Attractor Reconstructed from Chaotic Time Series	921
<i>V.F. Dailyudenko</i>	
Resource Management for Finite Element Codes on Shared Memory Systems	927
<i>J. Hungershöfer, J.-M. Wierum, H.-P. Gänser</i>	
n -Tuples of 0s and 1s: Necessary and Sufficient Conditions for Intrinsic Order	937
<i>L. González</i>	
Computational Algorithm and Architecture for AB^2 Multiplication in Finite Fields	947
<i>J.-C. Jeon, K.-Y. Yoo</i>	
A Novel De-interlacing Technique Using Bi-directional Motion Estimation .	957
<i>Y. Kim, K.-S. Choi, J.-Y. Pyun, B.-T. Choi, S.-J. Ko</i>	
On the Design and Implementation of a Portable DSM System for Low-Cost Multicomputers	967
<i>F. Meza, A.E. Campos, C. Ruz</i>	
On a Coupled Thermo-Hydro-Mechanical Problem Based on the Thermo-Visco-Plastic Rheology	977
<i>J. Nedoma</i>	
Parallel Genetic Algorithm for a Flow-Shop Problem with Multiprocessor Tasks	987
<i>C. Oğuz, Y.-F. Fung, M.F. Ercan, X.T. Qi</i>	
A New Availability Concept for (n,k) -way Cluster Systems Regarding Waiting Time	998
<i>K. Park, S. Kim, J.-C. Liu</i>	

A Study of Tuning Hyperparameters for Support Vector Machines	1006
<i>Y. Quan, J. Yang, C. Ye</i>	
A Method for Discretization in Time Based on Cayley Transform for Parabolic Transmission Problem	1016
<i>N. Rossokhata</i>	
Design and Implementation of a Parallel Prime Edge-Length Symmetric FFT	1025
<i>J. Seguel</i>	
A Posteriori Output Bound for Partial Differential Equations Based on Elemental Error Bound Computing.	1035
<i>Z.C. Xuan, K.H. Lee, J. Peraire</i>	
A Bird's Eye View of Matrix Distributed Processing.	1045
<i>M. Di Pierro</i>	
Author Index	1053

Table of Contents, Part II

Modeling of Location Management in Mobile Information Systems

Dynamic Recovery Algorithm for the Multiple Failures in the WDM Based UMTS Networks	1
<i>H.C. Kim, S. Ahn, J.W. Chung</i>	
Efficient Queuing Management Scheme with Image/Voice/Data Calls for Reducing Blocking Rate in Multimedia Mobile Networks	11
<i>W.S. Na, D.C. Lee, I.T. Ryou</i>	
Anomaly Detection Scheme Using Data Mining in Mobile Environment . . .	21
<i>K.-j. Park, H.-b. Ryou</i>	
Network-Based Real-Time Connection Traceback System (NRCTS) with Packet Marking Technology	31
<i>Y.-S. Choi, D.-i. Seo, S.-W. Sohn, S.-H. Lee</i>	
Mobile Broadcasting Copyrights Model Based on XrML	41
<i>C.-W. Kang, H. Yoo, H.K. Jung</i>	
Mobility Management Scheme for Reducing Location Traffic Cost in IMT-2000 Networks	50
<i>D.C. Lee, J.G. Kim, K.J. Kim</i>	
Web-Based Object-Oriented Modeling on Internet	60
<i>S.H. Cho, H.-J. Kim, D.C. Lee</i>	

Automatic Differentiation and Applications

Uncertainty Analysis Based on Sensitivities Generated Using Automatic Differentiation	70
<i>J. Barhen, D.B. Reister</i>	
Evaluation of a Computer Model for Wavy Falling Films Using EFCOSS . .	78
<i>C.H. Bischof, H.M. Bückler, A. Rasch, E. Slusanschi</i>	
Automatic Differentiation for Optimum Design, Applied to Sonic Boom Reduction	85
<i>L. Hascoët, M. Vázquez, A. Dervieux</i>	
An Example of an Automatic Differentiation-Based Modelling System	95
<i>T. Kaminski, R. Giering, M. Scholze, P. Rayner, W. Knorr</i>	

Coupling Tangent-Linear and Adjoint Models. 105
U. Naumann, P. Heimbach

Hierarchical Automatic Differentiation by Vertex Elimination and Source Transformation 115
M. Tadjouddine, S.A. Forth, J.D. Pryce

Mobile Computing: Routing and Handoff

An Enhanced Hand-Off Policy to Reduce Blocking Probability in Two-Layer Wireless Systems 125
T.-J. Lee

On Bandwidth Adjusted Multicast in Pipelined Routing Architecture for Mobile Environment 135
Y.-C. Bang, W.-S. Jang, B.J. Ahn, J.-H. Hahn

Cost Effective Location Management Scheme Based on Hierarchical Mobile IPv6 144
D.K. Choi, H. Choo, J.-K. Park

On Employing Hierarchical Structure in PCS Networks 155
I.-H. Shin, G.-L. Park

Design of Mobile IP Extension for Nested Mobile Network 163
H. Kang, K. Kim

Dual Transmission Architecture for Mobile Multicasting 171
K.-Y. Park, S.-Y. Han, B.-G. Joo

Mobile Computing: Authentication Technology

Secure Source Specific Multicast for Networks Including Mobile Hosts 181
Y.-C. Shim, J.-C. Park

Security Analysis and Applications of Standard Key Agreement Protocols . 191
S. Oh, J. Kwak, S. Lee, D. Won

An Improved Password Authentication Key Exchange Protocol for 802.11 Environment 201
S.J. Yu, J.S. Song

A Ticket-Based AAA Security Mechanism in Mobile IP Network 210
J.-M. Park, E.-H. Bae, H.-J. Pyeon, K. Chae

Secure and Scalable Mobile IP Registration Scheme Using PKI 220
J.-P. Yoo, K. Kim, H. Choo, J.-i. Lee, J.S. Song

Secure Session Key Exchange for Mobile IP Low Latency Handoffs 230
H.G. Kim, D.H. Choi, D.Y. Kim

Coarse Grained Parallel Algorithms for Scientific Applications

A Coarse-Grained Multicomputer Algorithm for the Longest Repeated Suffix Ending at Each Point in a Word	239
<i>T. Garcia, D. Semé</i>	
A Parallel Wavefront Algorithm for Efficient Biological Sequence Comparison	249
<i>C.E.R. Alves, E.N. Cáceres, F. Dehne, S.W. Song</i>	
Mining Multivariate Time Series Models with Soft-Computing Techniques: A Coarse-Grained Parallel Computing Approach	259
<i>J.J. Valdés, A.J. Barton</i>	
Towards Realistic Implementations of External Memory Algorithms Using a Coarse Grained Paradigm	269
<i>J. Gustedt</i>	
Designing an Efficient Partitioning Algorithm for Grid Environments with Application to N-body Problems	279
<i>D.J. Harvey, S.K. Das, R. Biswas</i>	
Coarse-Grained Parallel Matrix-Free Solution of a Three-Dimensional Elliptic Prototype Problem	290
<i>K.P. Allen, M.K. Gobbert</i>	
Parallel <i>CLUSTAL W</i> for PC Clusters	300
<i>J. Cheetham, F. Dehne, S. Pitre, A. Rau-Chaplin, P.J. Taillon</i>	

Theme: Information Systems and Technologies

Security and Watermarking

A Robust Watermarking Technique in Geometric Distortion of Digital Image	310
<i>W. Kim, I.-J. Ko, N.-Y. Lee, G.-Y. Kim, H.-I. Choi</i>	
Design of Secure Monitor in the Secure Zone Cooperation	320
<i>G. Ahn, B. Chang, T.M. Chung</i>	
A Proposal for DoS-Defensive Internet Key Exchange	328
<i>M.S. Choi, D.J. Kwak, S.J. Moon</i>	
A Random M-ary Method Based Countermeasure against Side Channel Attacks	338
<i>M.K. Ahn, J.C. Ha, H.J. Lee, S.J. Moon</i>	

Wavelet-Based Blind Watermarking Technique for Real-Time Watermark Interpretation 348
K.-S. Yoo, W.-H. Lee

Design of Active HoneyPot System 356
M. Kim, M. Kim, H.K. Lee, Y. Mun

Localized Authentication Scheme Using AAA in Mobile IPv6 365
M. Kim, J. Park, M. Kim, Y. Mun

Autonomous Agents-Based Security Infrastructure 374
S. Corsava, V. Getov

Graphics and Image

The Modified Block Matching Algorithm for a Hand Tracking of an HCI System 383
J.O. Kim, H.J. Chang, C.H. Chung

Face Retrieval Using 1st- and 2nd-order PCA Mixture Model 391
S. Lee, H.-C. Kim, D. Kim, Y.S. Choi

Concept Based Image Retrieval Using the Domain Ontology 401
W. Kim, H. Kong, K. Oh, Y. Moon, P. Kim

On Natural Motion Editing by a Geometric Mean Filter 411
J.O. Kim, C.H. Oh, C.H. Chung, J. Hwang, W. Lee

High Quality VoD Service Architecture on Broadband Internet 419
S. Lee

Geometric Querying for Dynamic Exploration of Multidimensional Data .. 427
O. Sourina

Mobile and Wireless Networking

Design of Dynamic Slot Assignment Protocol for Wireless Communication 437
H. Yoe, Y. Lee, J. Koh

Adaptive Modulation and Coding of MIMO in Next Generation Mobile Systems 445
S. Ro, I. Hwang, D. Hong, C. Kang, M. Kang

Performance Improvement of DS/CDMA System under Impulsive Noise Environments 455
H.G. Kang, S.E. Cho, H. Yoe, J.G. Koh, Y.S. Choi

The Modeling and Traffic Feedback Control for QoS Management on Local Network	463
<i>J. Park, E.-N. Huh, Y. Mun, B.-G. Lee</i>	

Design and Verification of Interworking Protocol for CC and SIP in Generation Mobile Network	472
<i>S.-H. Jung, S.-C. Park</i>	

VOD Service Using Web-Caching Technique on the Head-End-Network ...	482
<i>I. Kim, B. Kim, Y. Woo, T. Hwang, S. Kang</i>	

Operating Systems Techniques and Databases

Hybrid Scheme for Ubiquitous Computing	490
<i>H.-K. Kim</i>	

An Enhanced Main Memory Index Structure Employing the Level Prefetching Technique	498
<i>H.T. Hong, J.I. Pee, S.I. Song, J.S. Yoo</i>	

Reusable Software Component Retrieval System Based on Web	507
<i>K.S. Young, C.D. Oun</i>	

A Hybrid Concurrency Control with Deadlock-free Approach	517
<i>S.H. Cho</i>	

Weak Consistency in Hybrid Group Update for Replication	525
<i>B.-w. Lee</i>	

Experimental Evaluation of Query Fingerprinting with Embedded Search Term Markers	532
<i>B. Kim</i>	

Software Development

An Efficient Optimization Algorithm of Java Bytecode to Reduce Network Traffic	542
<i>D.-W. Kim, M.-S. Jung</i>	

An Efficient Small Sized On-Card Verifier for Java Card	552
<i>J.-B. Cho, M.-S. Jung, S.-I. Jun</i>	

Distributed Object-Oriented Parallel Programming Environment on Grid .	562
<i>Y.-J. Woo, C.-S. Jeong</i>	

An Architecture for C-commerce System Design	571
<i>H. Park, W. Suh</i>	

A Probabilistic Model for Predicting Software Development Effort	581
<i>P.C. Pendharkar, G.H. Subramanian, J.A. Rodger</i>	

Knowledge Acquisition in the Nutri-Fuzzy-ORIXAS Project 589
*V.M. Benjamim Werneck, A. Brito F. Oliveira, R. Serrão Lanzillotti,
H. Serrão Lanzillotti, E. de Abreu Soares, E. Souza Portella,
S. da Silva Ávila*

Speech Recognition and Agent Technologies

The Merging Algorithm for an Extraction of Valid Speech-Sounds 599
J.O. Kim, H.W. Paek, C.H. Chung, W.Y. Yim, S.H. Lee

Agent Migration Information System for the Efficient Migration of the
Mobile Agent 607
H.-J. Park

Schematic Aspect for Autonomous Agent 614
K.S. Tae

Robust Speaker Recognition Against Utterance Variations 624
J.J. Lee, J.Y. Rheem, K.Y. Lee

Efficient Speaker Identification Based on Robust VQ-PCA 631
Y. Lee, J. Lee, K.Y. Lee

An Amplitude Warping Approach to Intra-speaker Normalization for Speech
Recognition 639
K.-S. Hong

Computational Theory and Test and Simulation

Scenario Based Testing & Test Plan Metrics Based on a Use Case Approach
for Real Time UPS (Uninterruptible Power System) 646
R.Y.-C. Kim, B.-G. Joo, K.-C. Kim, B.-k. Joen

A Study on Insuring the Full Reliability of Finite State Machine 656
S. Yang, M.J. Kim, J.H. Park, H. Chang

Distributed Multiple-Path Searching Algorithm for Fault Detection..... 664
S. Kim, S. Ahn, J.W. Chung

An Object-Oriented Simulation System for Air Defense 674
C.-S. Jeong, S.-Y. Choi

Evaluation and Analysis of Computational Complexity for Secure
Multicast Models 684
E. Blessing R., R. Uthariaraj

An Algorithm for Diagnosing System with Structured Description 695
S. Luan, G. Dai

Wave Phenomena in Physics and Engineering: New Models, Algorithms, and Applications

FETD Simulation of Wave Propagation Modeling the Cari Breast Sonography	705
<i>A. Bounaïm, S. Holm, W. Chen, Å. Ødegård, A. Tveito, K. Thomenius</i>	
Finite Element Simulation of BAW Propagation in Inhomogeneous Plate Due to Piezoelectric Actuation	715
<i>A. Chakraborty, D. Roy Mahapatra, S. Gopalakrishnan</i>	
Exact Solutions of the Generalized Equal Width Wave Equation	725
<i>S. Hamdi, W.H. Enright, W.E. Schiesser, J.J. Gottlieb</i>	
Quantum Dot and Acoustic Enclosure Problems in Lens-Shaped Structures	735
<i>M. Willatzen and L.C. Lew Yan Voon</i>	
A Nonlinear Spectral Finite Element Model for Analysis of Wave Propagation in Solid with Internal Friction and Dissipation	745
<i>D. Roy Mahapatra, S. Gopalakrishnan</i>	
Finite Element Analysis of Nanowire Superlattice Structures	755
<i>M. Willatzen, R.V.N. Melnik, C. Galeriu, L.C. Lew Yan Voon</i>	
On a Class of Boussinesq Equations for Shallow Water Waves	764
<i>P. Daripa, R.K. Dash</i>	
Elastic Waves Propagation in Damped Media	774
<i>E.L. Albuquerque, P.W. Mauriz</i>	
A Fast Algorithm for Moving Interface Problems	782
<i>S. Dutta, J. Glimm, J.W. Grove, D.H. Sharp, Y. Zhang</i>	
Computational Aspects of Conservative Difference Schemes for Shape Memory Alloys Applications	791
<i>R.V.N. Melnik, L. Wang, P. Matus, I. Rybak</i>	
Optimization in the Context of Active Control of Sound	801
<i>J. Lončarić, S. Tsynkov</i>	
On Disintegration of Cellular Flames	811
<i>L. Kagan, S. Minaev, G. Sivashinsky</i>	
Investigation of a Three-Dimensional Spectral Element Method for Helmholtz's Equation	819
<i>O.Z. Mehdizadeh, M. Paraschivoiu</i>	
Effect of Vortex Profile on Sound Generation in a Non-uniform Flow	826
<i>A. Povitsky, T. Zheng, G. Vattistas</i>	

Numerical Simulation of Laminar Mixing Surfaces in Converging
Microchannel Flows 837
M. McGarry and D.L. Hitt

Preconditionning Techniques for the Solution of the Helmholtz Equation
by the Finite Element Method 847
R. Kechroud, A. Soulaïmani, Y. Saad

Direct Numerical Simulations of Instability-Wave Generation and
Propagation in Supersonic Boundary Layers 859
L. Jiang, M. Choudhari, C.-L. Chang, C. Liu

Modeling of Plume Dynamics and Shock Wave in Laser Ablation with
Application to Nano-Technology 871
D.C. Lobão, A. Povitsky

Monte Carlo Simulation of Spin-Polarized Transport 881
M. Shen, S. Saikin, M.-C. Cheng, V. Privman

Web-Based Learning

A Web-Based Environmental Education System for Elementary School
Students 892
Y. Chae, S. Hong, W. Jun

Evaluating the Web-Based Instruction by Item Analysis 901
E. Chi, C. Park, H. Rim

Supporting Transactional Service for Virtual School Environments 909
S. Hong, W. Jun

Design and Implementation of a Hybrid Instruction Model for Web-Based
Learning 916
C. Park, M. Kim

Design and Implementation of a Web-Based Information Literacy
Cultivation System for Emotionally Disturbed Students 924
G. Lee, S.-K. Hong, W. Jun

Author Index 935