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
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)
Renee 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)
Reneé 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 II

### Modeling of Location Management in Mobile Information Systems

Dynamic Recovery Algorithm for the Multiple Failures in the WDM Based UMTS Networks .................................................. 1  
*H.C. Kim, S. Ahn, J.W. Chung*

Efficient Queuing Management Scheme with Image/Voice/Data Calls for Reducing Blocking Rate in Multimedia Mobile Networks ................. 11  
*W.S. Na, D.C. Lee, I.T. Ryoo*

Anomaly Detection Scheme Using Data Mining in Mobile Environment ... 21  
*K.-j. Park, H.-b. Ryou*

Network-Based Real-Time Connection Traceback System (NRCTS) with Packet Marking Technology ................................. 31  
*Y.-S. Choi, D.-i. Seo, S.-W. Sohn, S.-H. Lee*

Mobile Broadcasting Copyrights Model Based on XrML .................. 41  
*C.-W. Kang, H. Yoo, H.K. Jung*

Mobility Management Scheme for Reducing Location Traffic Cost in IMT-2000 Networks .................................................... 50  
*D.C. Lee, J.G. Kim, K.J. Kim*

Web-Based Object-Oriented Modeling on Internet ...................... 60  
*S.H. Cho, H.-J. Kim, D.C. Lee*

### Automatic Differentiation and Applications

Uncertainty Analysis Based on Sensitivities Generated Using Automatic Differentiation ......................................................... 70  
*J. Barhen, D.B. Reister*

Evaluation of a Computer Model for Wavy Falling Films Using EFCOSS . 78  
*C.H. Bischof, H.M. Bücker, A. Rasch, E. Slusanschi*

Automatic Differentiation for Optimum Design, Applied to Sonic Boom Reduction ......................................................... 85  
*L. Hascoët, M. Vázquez, A. Dervieux*

An Example of an Automatic Differentiation-Based Modelling System .... 95  
*T. Kaminski, R. Giering, M. Scholze, P. Rayner, W. Knorr*
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling Tangent-Linear and Adjoint Models</td>
<td>105</td>
</tr>
<tr>
<td>U. Naumann, P. Heimbach</td>
<td></td>
</tr>
<tr>
<td>Hierarchical Automatic Differentiation by Vertex Elimination and Source Transformation</td>
<td>115</td>
</tr>
<tr>
<td>M. Tadjouddine, S.A. Forth, J.D. Pryce</td>
<td></td>
</tr>
<tr>
<td><strong>Mobile Computing: Routing and Handoff</strong></td>
<td></td>
</tr>
<tr>
<td>T.-J. Lee</td>
<td></td>
</tr>
<tr>
<td>On Bandwidth Adjusted Multicast in Pipelined Routing Architecture for Mobile Environment</td>
<td>135</td>
</tr>
<tr>
<td>Cost Effective Location Management Scheme Based on Hierarchical Mobile IPv6</td>
<td>144</td>
</tr>
<tr>
<td>D.K. Choi, H. Choo, J.-K. Park</td>
<td></td>
</tr>
<tr>
<td>On Employing Hierarchical Structure in PCS Networks</td>
<td>155</td>
</tr>
<tr>
<td>I.-H. Shin, G.-L. Park</td>
<td></td>
</tr>
<tr>
<td>Design of Mobile IP Extension for Nested Mobile Network</td>
<td>163</td>
</tr>
<tr>
<td>H. Kang, K. Kim</td>
<td></td>
</tr>
<tr>
<td>Dual Transmission Architecture for Mobile Multicasting</td>
<td>171</td>
</tr>
<tr>
<td>K.-Y. Park, S.-Y. Han, B.-G. Joo</td>
<td></td>
</tr>
<tr>
<td><strong>Mobile Computing: Authentication Technology</strong></td>
<td></td>
</tr>
<tr>
<td>Secure Source Specific Multicast for Networks Including Mobile Hosts</td>
<td>181</td>
</tr>
<tr>
<td>Y.-C. Shim, J.-C. Park</td>
<td></td>
</tr>
<tr>
<td>Security Analysis and Applications of Standard Key Agreement Protocols</td>
<td>191</td>
</tr>
<tr>
<td>S. Oh, J. Kwak, S. Lee, D. Won</td>
<td></td>
</tr>
<tr>
<td>An Improved Password Authentication Key Exchange Protocol for 802.11 Environment</td>
<td>201</td>
</tr>
<tr>
<td>S.J. Yu, J.S. Song</td>
<td></td>
</tr>
<tr>
<td>A Ticket-Based AAA Security Mechanism in Mobile IP Network</td>
<td>210</td>
</tr>
<tr>
<td>J.-M. Park, E.-H. Bae, H.-J. Pyeon, K. Chae</td>
<td></td>
</tr>
<tr>
<td>Secure and Scalable Mobile IP Registration Scheme Using PKI</td>
<td>220</td>
</tr>
<tr>
<td>J.-P. Yoo, K. Kim, H. Choo, J.-i. Lee, J.S. Song</td>
<td></td>
</tr>
<tr>
<td>Secure Session Key Exchange for Mobile IP Low Latency Handoffs</td>
<td>230</td>
</tr>
</tbody>
</table>
## 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  
   T. Garcia, D. Semé

A Parallel Wavefront Algorithm for Efficient Biological Sequence Comparison ......................................................... 249  
   C.E.R. Alves, E.N. Cáceres, F. Dehne, S.W. Song

Mining Multivariate Time Series Models with Soft-Computing Techniques:  
A Coarse-Grained Parallel Computing Approach .......................... 259  
   J.J. Valdés, A.J. Barton

Towards Realistic Implementations of External Memory Algorithms Using a Coarse-Grained Paradigm .................................................. 269  
   J. Gustedt

Designing an Efficient Partitioning Algorithm for Grid Environments with Application to N-body Problems ................................................. 279  
   D.J. Harvey, S.K. Das, R. Biswas

Coarse-Grained Parallel Matrix-Free Solution of a Three-Dimensional Elliptic Prototype Problem ................................................... 290  
   K.P. Allen, M.K. Gobbert

Parallel CLUSTAL W for PC Clusters ........................................... 300  
   J. Cheetham, F. Dehne, S. Pitre, A. Rau-Chaplin, P.J. Taillon

### Theme: Information Systems and Technologies

#### Security and Watermarking

A Robust Watermarking Technique in Geometric Distortion of Digital Image .......................................................... 310  
   W. Kim, I.-J. Ko, N.-Y. Lee, G.-Y. Kim, H.-I. Choi

Design of Secure Monitor in the Secure Zone Cooperation .................. 320  
   G. Ahn, B. Chang, T.M. Chung

A Proposal for DoS-Defensive Internet Key Exchange .................... 328  
   M.S. Choi, D.J. Kwak, S.J. Moon

A Random M-ary Method Based Countermeasure against Side Channel Attacks ........................................................... 338  
   M.K. Ahn, J.C. Ha, H.J. Lee, S.J. Moon
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

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

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
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Modeling and Traffic Feedback Control for QoS Management on Local Network</td>
<td>463</td>
</tr>
<tr>
<td>J. Park, E.-N. Huh, Y. Mun, B.-G. Lee</td>
<td></td>
</tr>
<tr>
<td>Design and Verification of Interworking Protocol for CC and SIP in Generation Mobile Network</td>
<td>472</td>
</tr>
<tr>
<td>S.-H. Jung, S.-C. Park</td>
<td></td>
</tr>
<tr>
<td>VOD Service Using Web-Caching Technique on the Head-End-Network</td>
<td>482</td>
</tr>
<tr>
<td>I. Kim, B. Kim, Y. Woo, T. Hwang, S. Kang</td>
<td></td>
</tr>
<tr>
<td>Operating Systems Techniques and Databases</td>
<td></td>
</tr>
<tr>
<td>Hybrid Scheme for Ubiquitous Computing</td>
<td>490</td>
</tr>
<tr>
<td>H.-K. Kim</td>
<td></td>
</tr>
<tr>
<td>An Enhanced Main Memory Index Structure Employing the Level Prefetching Technique</td>
<td>498</td>
</tr>
<tr>
<td>H.T. Hong, J.I. Pee, S.I. Song, J.S. Yoo</td>
<td></td>
</tr>
<tr>
<td>Reusable Software Component Retrieval System Based on Web</td>
<td>507</td>
</tr>
<tr>
<td>K.S. Young, C.D. Oun</td>
<td></td>
</tr>
<tr>
<td>A Hybrid Concurrency Control with Deadlock-free Approach</td>
<td>517</td>
</tr>
<tr>
<td>S.H. Cho</td>
<td></td>
</tr>
<tr>
<td>Weak Consistency in Hybrid Group Update for Replication</td>
<td>525</td>
</tr>
<tr>
<td>B.-w. Lee</td>
<td></td>
</tr>
<tr>
<td>Experimental Evaluation of Query Fingerprinting with Embedded Search Term Markers</td>
<td>532</td>
</tr>
<tr>
<td>B. Kim</td>
<td></td>
</tr>
<tr>
<td>Software Development</td>
<td></td>
</tr>
<tr>
<td>An Efficient Optimization Algorithm of Java Bytecode to Reduce Network Traffic</td>
<td>542</td>
</tr>
<tr>
<td>D.-W. Kim, M.-S. Jung</td>
<td></td>
</tr>
<tr>
<td>An Efficient Small Sized On-Card Verifier for Java Card</td>
<td>552</td>
</tr>
<tr>
<td>J.-B. Cho, M.-S. Jung, S.-I. Jun</td>
<td></td>
</tr>
<tr>
<td>Distributed Object-Oriented Parallel Programming Environment on Grid</td>
<td>562</td>
</tr>
<tr>
<td>Y.-J. Woo, C.-S. Jeong</td>
<td></td>
</tr>
<tr>
<td>An Architecture for C-commerce System Design</td>
<td>571</td>
</tr>
<tr>
<td>H. Park, W. Suh</td>
<td></td>
</tr>
<tr>
<td>A Probabilistic Model for Predicting Software Development Effort</td>
<td>581</td>
</tr>
<tr>
<td>P.C. Pendharkar, G.H. Subramanian, J.A. Rodger</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Knowledge Acquisition in the Nutri-Fuzzy-ORIXAS Project</td>
<td>589</td>
</tr>
<tr>
<td>V.M. Benjamim Werneck, A. Brito F. Oliveira, R. Serrão Lanzillotti,</td>
<td></td>
</tr>
<tr>
<td>H. Serrão Lanzilotti, E. de Abreu Soares, E. Souza Portella, S. da</td>
<td></td>
</tr>
<tr>
<td>Silva Ávila</td>
<td></td>
</tr>
<tr>
<td><strong>Speech Recognition and Agent Technologies</strong></td>
<td></td>
</tr>
<tr>
<td>The Merging Algorithm for an Extraction of Valid Speech-Sounds</td>
<td>599</td>
</tr>
<tr>
<td>Agent Migration Information System for the Efficient Migration of the</td>
<td>607</td>
</tr>
<tr>
<td>Mobile Agent</td>
<td></td>
</tr>
<tr>
<td>H.-J. Park</td>
<td></td>
</tr>
<tr>
<td>Schematic Aspect for Autonomous Agent</td>
<td>614</td>
</tr>
<tr>
<td>K.S. Tae</td>
<td></td>
</tr>
<tr>
<td>Robust Speaker Recognition Against Utterance Variations</td>
<td>624</td>
</tr>
<tr>
<td>J.J. Lee, J.Y. Rheem, K.Y. Lee</td>
<td></td>
</tr>
<tr>
<td>Efficient Speaker Identification Based on Robust VQ-PCA</td>
<td>631</td>
</tr>
<tr>
<td>Y. Lee, J. Lee, K.Y. Lee</td>
<td></td>
</tr>
<tr>
<td>An Amplitude Warping Approach to Intra-speaker Normalization for Speech Recognition</td>
<td>639</td>
</tr>
<tr>
<td>K.-S. Hong</td>
<td></td>
</tr>
<tr>
<td><strong>Computational Theory and Test and Simulation</strong></td>
<td></td>
</tr>
<tr>
<td>Scenario Based Testing &amp; Test Plan Metrics Based on a Use Case Approach for Real Time UPS (Uninterruptible Power System)</td>
<td>646</td>
</tr>
<tr>
<td>R.Y.-C. Kim, B.-G. Joo, K.-C. Kim, B.-k. Joen</td>
<td></td>
</tr>
<tr>
<td>A Study on Insuring the Full Reliability of Finite State Machine</td>
<td>656</td>
</tr>
<tr>
<td>S. Yang, M.J. Kim, J.H. Park, H. Chang</td>
<td></td>
</tr>
<tr>
<td>Distributed Multiple-Path Searching Algorithm for Fault Detection</td>
<td>664</td>
</tr>
<tr>
<td>S. Kim, S. Ahn, J.W. Chung</td>
<td></td>
</tr>
<tr>
<td>An Object-Oriented Simulation System for Air Defense</td>
<td>674</td>
</tr>
<tr>
<td>C.-S. Jeong, S.-Y. Choi</td>
<td></td>
</tr>
<tr>
<td>Evaluation and Analysis of Computational Complexity for Secure</td>
<td>684</td>
</tr>
<tr>
<td>Multicast Models</td>
<td></td>
</tr>
<tr>
<td>E. Blessing R., R. Uthariaraj</td>
<td></td>
</tr>
<tr>
<td>An Algorithm for Diagnosing System with Structured Description</td>
<td>695</td>
</tr>
<tr>
<td>S. Luan, G. Dai</td>
<td></td>
</tr>
</tbody>
</table>
Wave Phenomena in Physics and Engineering: New Models, Algorithms, and Applications

FETD Simulation of Wave Propagation Modeling the Cari Breast Sonography ................................................................. 705
  A. Boumaïm, S. Holm, W. Chen, Å. Ødegård, A. Tveito, K. Thomenius

Finite Element Simulation of BAW Propagation in Inhomogeneous Plate Due to Piezoelectric Actuation .............................................................. 715
  A. Chakraborty, D. Roy Mahapatra, S. Gopalakrishnan

Exact Solutions of the Generalized Equal Width Wave Equation ......... 725

Quantum Dot and Acoustic Enclosure Problems in Lens-Shaped Structures ........................................................................ 735
  M. Willatzen and L.C. Lew Yan Voon

A Nonlinear Spectral Finite Element Model for Analysis of Wave Propagation in Solid with Internal Friction and Dissipation .......... 745
  D. Roy Mahapatra, S. Gopalakrishnan

Finite Element Analysis of Nanowire Superlattice Structures ............ 755
  M. Willatzen, R.V.N. Melnik, C. Galeri, L.C. Lew Yan Voon

On a Class of Boussinesq Equations for Shallow Water Waves ......... 764
  P. Daripa, R.K. Dash

Elastic Waves Propagation in Damped Media ........................................ 774
  E.L. Albuquerque, P.W. Mauriz

A Fast Algorithm for Moving Interface Problems .............................. 782
  S. Dutta, J. Glimm, J.W. Grove, D.H. Sharp, Y. Zhang

Computational Aspects of Conservative Difference Schemes for Shape Memory Alloys Applications ................................................. 791
  R.V.N. Melnik, L. Wang, P. Matus, I. Rybak

Optimization in the Context of Active Control of Sound ................. 801
  J. Lončarić, S. Tsynkov

On Disintegration of Cellular Flames .............................................. 811
  L. Kagan, S. Minaev, G. Sivashinsky

Investigation of a Three-Dimensional Spectral Element Method for Helmholtz’s Equation ....................................................... 819
  O.Z. Mehdizadeh, M. Paraschivoiu

Effect of Vortex Profile on Sound Generation in a Non-uniform Flow ..... 826
  A. Povitsky, T. Zheng, G. Vatistas
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. Soulaimani, 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
# Table of Contents, Part I

## Invited Paper

Random Number Generators with Period Divisible by a Mersenne Prime

*R.P. Brent, P. Zimmermann*

## Scientific Visualization

Visualizing Large Relational Datasets by Combining Grand Tour with Footprint Splatting of High Dimensional Data Cubes

*L. Yang*

Visualizing Frequent Itemsets, Association Rules, and Sequential Patterns in Parallel Coordinates

*L. Yang*

Information Extraction to Generate Visual Simulations of Car Accidents from Written Descriptions

*P. Nugues, S. Dupuy, A. Egges*

Interactive Stereoscopic Visualization of Very Large Visible Men on CAVE

*I. Ihm, B. Lee, J.-Y. Lee, M. Joh, S. Park*

Panoramic Spherical Video – The Space Ball

*J.E. Coleshill, A. Ferworn*

Human Expressions Interaction Between Avatar and Virtual World

*R. Liang, C. Chen, Z. Pan, J. Bu*

## Image Processing

Progressive Curve Representation Based on Reverse Subdivision

*F.F. Samavati, M.A. Nur, R. Bartels, B. Wyvill*

Concept-Based Image Retrieval Using the New Semantic Similarity Measurement

*J. Choi, M. Cho, S.H. Park, P. Kim*

Case- and Rule-Based Algorithms for the Contextual Pattern Recognition Problem

*M. Wozniak*
A Simple Algorithm for Object Location from a Single Image without Camera Calibration ................................................ 99
   M. Bénallal, J. Meunier

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

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

Computer, Mobile, and Data Networks

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

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

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

Dynamic Clustering of Web Search Results .................................... 153
   L. Yang, A. Rahi

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

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

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

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

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

Efficient and Fast Discovery of Slave Home Agent’s Address in Mobile
IPv6 ....................................................................................... 209
   P.S. Kim, Y.K. Kim
Adaptive Information Exchange with Field Bus Systems .......................... 217
S. Eberle, P. Göhner

A Replication Protocol with Composite Topology for High Adaptability .... 227
S.C. Choi, H.Y. Youn, J.K. Park, J.S. Choi

How Secure Personal Mobility Can Be? .................................................. 238
S. Vincze

Algorithms and Applications

Generation of Valid Labeled Binary Trees ............................................ 245
B. Effantin

Scheduling Intervals Using Independent Sets in Claw-Free Graphs ........... 254
D.R. Gaur, R. Krishnamurti

A Novel Approach to Optimal Packing Using Composite Object Geometry .......................................................... 263
M.M. Atiquullah, E.M. Crespo

A Discrete Farkas Lemma .......................................................................... 273
J.B. Lasserre

Elementary Encoding by Evolutionary Approach ........................................ 282
I. Vasyltsou

An Efficient Algorithm for the Compression of Time-Dependent Data from Scientific Simulations .......................................................... 291
C. Li, P.E. Plassmann

Rate Control for Low Bit Rate Video via Enhanced Frame Skipping .......... 302
J.-Y. Pyun, Y. Kim, S.-J. Ko

Automatic Object-Based Video Segmentation Using Distributed Genetic Algorithms .................................................. 312
E.Y. Kim, S.H. Park

3D Protein Peptide Chain Search Using an Improved Genetic Algorithm ... 322
Z. Yang, G. Liu

Efficient Inversion Algorithm for Optimal Normal Bases Type II ............ 330
H.S. Yoo, E.S. Kim

Dual Space Drawing Methods of Cylinders ................................................. 338
R. Ding

Implementation of Smartcard Using Multi Authentication Method ........... 348
S.-E. Lee, H.-J. Jang, S.-Y. Han
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
  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
   J. Bohbot, M. Zolver, D. Klahr, A. Torres

Computational Modelling of Particle Degradation in Dilute Phase Pneumatic Conveyors ......................................................... 493
   P. Chapelle, N. Christakis, H. Abou-Chakra, U. Tuzun, I. Bridle,
   M.S.A. Bradley, M.K. Patel, M. Cross

Simulation of Chemical Reaction Fronts in Anaerobic Digestion of Solid Waste ............................................................. 503
   H.J. Eberl

Numerical Studies of Turbulent Jet Hydrogen/Air Diffusion Flames with Local Quenching Using Stiff Complex Chemistry .................... 513
   X. Zhou, D.L. Hitt

Computational Modeling of Geophysical Systems ............................ 523
   S. Davenport, P. Seshaiyer

Modeling and Simulation of an Experimental Manufacturing Cell .......... 533
   N. Rakoto-Ravalontsalama, J.L. Villa

A Study of Three-Dimensional Preferential Flow Using a Web-Based Simulation System ............................................................... 539
   V.J. Alarcon, H. Zeng, W. Kingery, H.M. Selim, J. Zhu

Mathematical Modeling of Crown Forest Fires Initiation .................... 549
   V. Perminov

Numerical Simulation of Free Surface MHD Flows: Richtmyer - Meshkov Instability and Applications .................................................... 558
   R. Samulyak, J. Glimm, W. Oh, H. Kirk, K. McDonald

Parallel Computing for Semiquantal Few-Body Systems in Atomic Physics ................................................................. 568
   R.A. Sultanov, D. Guster

Modelling Traffic Flow at a Multilane Intersection .......................... 577
   R. Wang, H.J. Ruskin

Some Recent Results on a Domain Decomposition Method in Biomechanics of Human Joints ......................................................... 587
   J. Nedoma, I. Hlaváček, J. Daněk, P. Vavřík, J. Stehlík, F. Denk

The Design and Implementation of Chinese Question and Answering System ........................................................................ 601
   I-H. Meng, W.-P. Yang
Computational Aspects of Data Mining ................................. 614
   F.A. M˘arginean

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
M.F. Ercan, Y.F. Fung

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

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

Functional Analysis
Uniform Approximations for Transcendental Functions..................... 780
S. Winitzki

Computing the Incomplete Gamma Function to Arbitrary Precision ...... 790
S. Winitzki

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

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

Large Scale Computing
A Performance Comparison of Matrix Solvers on Compaq Alpha, Intel Itanium, and Intel Itanium II Processors .................... 818
C.J.K. Tan, D. Hagan, M. Dixon

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

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

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

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

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

Time-Space Efficient Exponentiation over $GF(2^m)$ ...................... 875
K.-M. Ku, K.-J. Ha, K.-Y. Yoo
Efficient Architecture for Exponentiation and Division in GF($2^m$) Using Irreducible AOP ................................................................. 883
  W.-H. Lee, Y.-J. Heo, K.-Y. Yoo

A High-Performance UL Factorization for the Frontal Method .......... 893
  M. Bianco

The $p$-th Order Necessary Optimality Conditions for Inequality–Constrained Optimization Problems ............................................. 903
  O. Brezhneva, A. Tret’yakov

A Direct Method for Block-Toeplitz Systems with Applications to Re-manufacturing Systems ..................................................... 912
  W.-K. Ching, M.M. Ng, W.-O. Yuen

Reduced Fractal Analysis of the Multidimensional Attractor Reconstructed from Chaotic Time Series ........................................... 921
  V.F. Dailyudenko

Resource Management for Finite Element Codes on Shared Memory Systems .................................................................................. 927
  J. Hungershöfer, J.-M. Wierum, H.-P. Gänser

$n$-Tuples of 0s and 1s: Necessary and Sufficient Conditions for Intrinsic Order .................................................................................. 937
  L. González

Computational Algorithm and Architecture for AB$^2$ Multiplication in Finite Fields ................................................................. 947
  J.-C. Jeon, K.-Y. Yoo

A Novel De-interlacing Technique Using Bi-directional Motion Estimation .......................................................... 957
  Y. Kim, K.-S. Choi, J.-Y. Pyun, B.-T. Choi, S.-J. Ko

On the Design and Implementation of a Portable DSM System for Low-Cost Multicomputers ..................................................... 967
  F. Meza, A.E. Campos, C. Ruz

On a Coupled Thermo-Hydro-Mechanical Problem Based on the Thermo-Visco-Plastic Rheology .................................................. 977
  J. Nedoma

Parallel Genetic Algorithm for a Flow-Shop Problem with Multiprocessor Tasks ........................................................................... 987
  C. Oğuz, Y.-F. Fung, M.F. Ercan, X.T. Qi

A New Availability Concept for (n,k)-way Cluster Systems Regarding Waiting Time ............................................................... 998
  K. Park, S. Kim, J.-C. Liu
# Table of Contents, Part I

A Study of Tuning Hyperparameters for Support Vector Machines 1006
  Y. Quan, J. Yang, C. Ye

A Method for Discretization in Time Based on Cayley Transform for Parabolic Transmission Problem 1016
  N. Rossokhata

Design and Implementation of a Parallel Prime Edge-Length Symmetric FFT 1025
  J. Seguel

A Posteriori Output Bound for Partial Differential Equations Based on Elemental Error Bound Computing 1035
  Z.C. Xuan, K.H. Lee, J. Peraire

A Bird’s Eye View of Matrix Distributed Processing 1045
  M. Di Pierro

Author Index 1053
# 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  
* A.J. Brimicombe

PGIS, a Software for Paleogeographic Reconstruction in ArcGIS ........ 12  
* S. Mei

Spatial and Temporal Autocorrelation in Innovation Diffusion Analysis . . . 23  
* S. Bertazzon

Testing Differences between Case and Control Point Patterns Using Nearest Neighbour Distances and Bootstrapping ......................... 33  

Assessment of Different Link Functions for Modeling Binary Data to Derive Sound Inferences and Predictions .............................. 43  
* F. Huettmann, J. Linke

### Partitioning Mesh-Based Applications for Computational Grids

Improvements to the Helpful-Set Algorithm and a New Evaluation Scheme for Graph-Partitioners .................................................... 49  
* S. Schamberger

Mesh Partitioners for Computational Grids: A Comparison .................. 60  
* S. Huang, E. Aubanel, V.C. Bhavsar

CONFIIT: A Middleware for Peer to Peer Computing ....................... 69  
* O. Flauzac, M. Krajecki, J. Fugère

## Internet Communications Security

On MARS’s s-boxes Strength against Linear Cryptanalysis .................. 79  
* C.J. Hernández Castro, L.J. García Villalba, J.C. Hernández Castro, J.M. Sierra Cámara

A Secret Sharing Scheme Using Matrices ...................................... 84  
* C. Hernández-Goya, P. Caballero-Gil, C. Bruno-Castañeda
### Table of Contents, Part III

**A Modular Architecture for Distributed IDS in MANET**

*R.S. Puttini, J.-M. Percher, L. Mé, O. Camp, R. de Sousa Jr., C.J. Barenco Abbas, L.J. García-Villalba*  
Page 91

**Characterization of the Security Implications of Alternative E-procurement Topologies**

*E. Ponce, A. Durán*  
Page 114

**Protection of Multiagent Systems**

*J.M. Sierra, J.C. Hernández, E. Ponce, A. Ribagorda*  
Page 123

**On the Number of Equivalence Classes in Certain Stream Ciphers**

*L.J. García-Villalba*  
Page 129

## Computational Finance

**Parallelization and Vectorization of Simulation Based Option Pricing Methods**

*J. Schumacher, U. Jaekel, A. Basermann*  
Page 139

**An Algorithm for Determining the Controllers of Supervised Entities at the First and Second Levels: A Case Study with the Brazilian Central Bank**

*V.G. Fracari Branco, L. Weigang, M.P. Estrela Abad, J. Denzinger*  
Page 148

**Two Factor Option Pricing with Uncertain Volatility**

*D.M. Pooley, P.A. Forsyth, K.R. Vetzal*  
Page 158

**Improved Monte Carlo Linear Solvers Through Non-diagonal Splitting**

*A. Srinivasan, V. Aggarwal*  
Page 168

**Valuation of American Options Using Direct, Linear Complementarity-Based Methods**

*M.D. Koufisianis, T.S. Papatheodorou*  
Page 178

**Testing the Expectations Hypothesis for Interest Rate Term Structure: Some Australian Evidence**

*V. Fang, V.C.S. Lee*  
Page 189

**A Fourth Order $L$-stable Method for the Black-Scholes Model with Barrier Options**

*D.A. Voss, A.Q.M. Khaliq, S.H.K. Kazmi, H. He*  
Page 199

**Ranking Decision Variants by Subjective Paired Comparisons in Cases with Incomplete Data**

*M. Kwiesielewicz, E. van Uden*  
Page 208

**Quantum Games and Minimum Entropy**

*E. Jiménez*  
Page 216
Distributed Solution of High-Order Compact Difference Schemes for Multidimensional Convection-Diffusion Equations .................. 226
M.F. Dixon, K. Tan

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

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
B.A. Barsky, D.R. Horn, S.A. Klein, J.A. Pang, M. Yu

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

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

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

A Hybrid Scheme for Interactive Rendering a Virtual Environment ...... 285

Fast Adaptive Selection of Best Views .................................... 295
P.-P. Vázquez, M. Sbert

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

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

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

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

A Multiple Depth Buffer Implementation for Radiosity .................. 346
R. Martínez, L. Szirmay-Kalos, M. Sbert
### Geometry, Modeling, and Computer-Aided Geometric Design

Solving Geometric Constraints Invariant Modulo the Similarity Group  
É. Schramm, P. Schreck  
356

Triangular Bézier Surfaces of Minimal Area  
A. Arnal, A. Lluch, J. Monterde  
366

Projection Filling Based on Contour Structural Points  
D. Yu, H. Dong, W. Lai, Y. Yang  
376

A Graph Based Algorithm for Intersection of Subdivision Surfaces  
S. Lanquetin, S. Foufou, H. Kheddouci, M. Neveu  
387

Implicit Polynomial Support Optimized for Sparseness  
I.Z. Emiris, I.S. Kotsireas  
397

“CONTOUR” Algorithm for Finding and Visualizing Flat Sections of 3D-Objects  
D.V. Mogilenskih  
407

A Non-uniform Binary Space Partition Algorithm for 2D Implicit Curves  
F. Morgado, A. Gomes  
418

### Navigation, Compression, Meshes, Data Management

Web Visualization of Function-Defined Shapes  
A. Sourin, L.F. Min, K. Levinski  
428

Planar Subdivisions by Radical Axes Applied to Structural Morphology  
R. Togores, C. Otero  
438

Distribution of Vertex Indices in Edgebreaker  
448

A Comparison Study of Modern Heuristics for Solving the Partitioning Problem in Distributed Virtual Environment Systems  
P. Morillo, M. Fernández, J.M. Orduña  
458

Optimal Exploitation of Client Texture Hardware Capabilities on a Client-Server Remote Visualization Framework  
I. Boada, I. Navazo  
468

AIF - A Data Structure for Polygonal Meshes  
F.G.M. Silva, A.J.P. Gomes  
478

High Dynamic Range Image Texture Mapping Based on VRML  
S.-Y. Kim, B.-T. Choi  
488
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW Complexes: Topological Mainframe for Numerical Representations of Objects</td>
<td>498</td>
</tr>
<tr>
<td>P. Desbarats, S. Gueorguieva</td>
<td></td>
</tr>
<tr>
<td>Reconstruction, Approximation, and Morphing</td>
<td></td>
</tr>
<tr>
<td>Approximating 3D General Sweep Boundary Using Depth-Buffer</td>
<td>508</td>
</tr>
<tr>
<td>J. Ahn, S.J. Hong</td>
<td></td>
</tr>
<tr>
<td>Morphology-Based 3D Volume Metamorphosis</td>
<td>518</td>
</tr>
<tr>
<td>Self-correctional 3D Shape Reconstruction from a Single Freehand Line Drawing</td>
<td>528</td>
</tr>
<tr>
<td>B.S. Oh, C.H. Kim</td>
<td></td>
</tr>
<tr>
<td>3D Primitive Reconstruction Using the Line Segment with Single Image</td>
<td>539</td>
</tr>
<tr>
<td>CIGRO: A Minimal Instruction Set Calligraphic Interface for Sketch-Based Modeling</td>
<td>549</td>
</tr>
<tr>
<td>M. Contero, F. Naya, J. Jorge, J. Conesa</td>
<td></td>
</tr>
<tr>
<td>Computer Art: Computer Graphics Applications</td>
<td></td>
</tr>
<tr>
<td>MOTRICO Project: Geometric Construction and Mesh Generation of Blood Vessels in Coronary Bifurcation</td>
<td>559</td>
</tr>
<tr>
<td>F.J. Seron, E. Garcia, J. del Pico</td>
<td></td>
</tr>
<tr>
<td>Analysis Tool for Cataloguing Textile and Tile Pattern Designs</td>
<td>569</td>
</tr>
<tr>
<td>M. Valor, F. Albert, J.M. Gomis, M. Contero</td>
<td></td>
</tr>
<tr>
<td>Animation and Motion</td>
<td></td>
</tr>
<tr>
<td>Urban Site Modeling from LiDAR</td>
<td>579</td>
</tr>
<tr>
<td>S. You, J. Hu, U. Neumann, P. Fox</td>
<td></td>
</tr>
<tr>
<td>An Automatic Outline Fitting Algorithm for Arabic Characters</td>
<td>589</td>
</tr>
<tr>
<td>M. Sarfraz, M.A. Khan</td>
<td></td>
</tr>
<tr>
<td>Hardware-Accelerated Real-Time Rendering for 3D Sumi-e Painting</td>
<td>599</td>
</tr>
<tr>
<td>S.-J. Kang, S.-J. Kim, C.-H. Kim</td>
<td></td>
</tr>
<tr>
<td>Generation of Symmetrical Patterns Based on Text and Colour</td>
<td>609</td>
</tr>
<tr>
<td>A. Salman, R. Salman, E. Love</td>
<td></td>
</tr>
<tr>
<td>Reuse of Motion Capture Data in Animation: A Review</td>
<td>620</td>
</tr>
<tr>
<td>W. Geng, G. Yu</td>
<td></td>
</tr>
</tbody>
</table>
A Real-Time Natural Motion Edit by the Uniform Posture Map
Algorithm .......................................................... 630

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

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

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. Gavriloa
Computational Geometry and Applications

Geometric Graphs for Improving Nearest Neighbor Decision Rules .......... 762
  \hspace{5mm} G. Toussaint

Red-Blue Separability Problems in 3D ............................................. 766
  \hspace{5mm} F. Hurtado, C. Seara, S. Sethia

Two-Dimensional Range Search Based on the Voronoi Diagram ............... 776
  \hspace{5mm} T. Kanda, K. Sugihara

Computing a Closest Point to a Query Hyperplane in Three and Higher Dimensions ................................................................. 787
  \hspace{5mm} P. Mitra, A. Mukhopadhyay

Computing a Largest Empty Arbitrary Oriented Rectangle: Theory and Implementation ................................................................. 797
  \hspace{5mm} A. Mukhopadhyay, S.V. Rao

An Approximate Morphing between Polylines .................................. 807
  \hspace{5mm} S. Bespamyatnikh

Efficient Proximity Search for 3-D Cuboids .................................... 817
  \hspace{5mm} J. Gao, R. Gupta

An Explicit Solution for Computing the Euclidean $d$-dimensional Voronoi Diagram of Spheres in a Floating-Point Arithmetic ....................... 827
  \hspace{5mm} M.L. Gavrilova

Dynamically Maintaining a Hierarchical Planar Voronoi Diagram Approximation ................................................................. 836
  \hspace{5mm} I. Boada, N. Coll, J.A. Sellarès

Voronoi Diagram of Circles in a Large Circle .................................. 847
  \hspace{5mm} D.-S. Kim, D. Kim, K. Sugihara

On Estimating Result Sizes of Multi-way Spatial Joins ...................... 856
  \hspace{5mm} H.-H. Park

The Integer Hull of a Convex Rational Polytope ............................... 866
  \hspace{5mm} J.B. Lasserre

Straight-Line Drawings of General Trees with Linear Area and Arbitrary Aspect Ratio ................................................................. 876
  \hspace{5mm} A. Gary, A. Rusu

Connected Guards in Orthogonal Art Galleries ............................... 886
  \hspace{5mm} V. Pinciu
Four Colouring the Vertices of the Triangulation of a Polygon Containing a Hole ................................................................. 894
  G.M. Seed, D.E.R. Clark, R. Ocone, X.Y. Yang

Partitioning Polygons into Tree Monotone and Y-monotone Subpolygons . 903
  R.P. Boland, J. Urrutia

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

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