Table of Contents, Part I

Invited Speakers

Exploiting OpenMP to Provide Scalable SMP BLAS and LAPACK Routines
Cliff Addison. 3

Scientific Discovery through Advanced Computing
Carl Edward Oliver. 4

Quantification of Uncertainty for Numerical Simulations with Confidence Intervals
James Glimm. 5

Large-Scale Simulation and Visualization in Medicine: Applications to Cardiology, Neuroscience, and Medical Imaging
Christopher Johnson. 6

Can Parallel Programming Be Made Easy for Scientists?
Péter Kacsuk. 7

Software Support for High Performance Problem-Solving on Computational Grids
Ken Kennedy. 8

Lattice Rules and Randomized Quasi-Monte Carlo
Pierre L'Ecuyer. 9

Blue Gene: A Massively Parallel System
José E. Moreira. 10

Dynamic Grid Computing
Edward Siedel. 11

Robust Geometric Computation Based on Topological Consistency
Kokichi Sugihara. 12

Metacomputing with the Harness and IceT Systems
Vaidy Sunderam. 27

Computational Biology: IT Challenges and Opportunities
Stefan Unger, Andrew Komornicki. 28

Architecture-Specific Automatic Performance Tuning

A Data Broker for Distributed Computing Environments
L.A. Drummond, J. Demmel, C.R. Mechoso, H. Robinson, K. Sklower, J.A. Spahr. 31

Towards an Accurate Model for Collective Communications
Sathish Vadhiyar, Graham E. Fagg, and Jack J. Dongarra. . . . 41

A Family of High-Performance Matrix Multiplication Algorithms
John A. Gunnels, Greg M. Henry, Robert A. van de Geijn. . . . 51

Performance Evaluation of Heuristics for Scheduling Pipelined Multiprocessor Tasks
M. Fikret Ercan, Ceyda Oguz, Yu-Fai Fung. 61

Automatic Performance Tuning in the UHFFT Library
Dragan Mirković, S. Lennart Johnsson. 71

A Modal Model of Memory
Nick Mitchell, Larry Carter, Jeanne Ferrante. 81
Fast Automatic Generation of DSP Algorithms
Markus Püschel, Bryan Singer, Manuela Veloso, José M.F. Moura. 97
Cache-Efficient Multigrid Algorithms
Sriram Sellappa, Siddhartha Chatterjee. 107
Statistical Models for Automatic Performance Tuning
Richard Vuduc, James W. Demmel, Jeff Bilmes. 117
Optimizing Sparse Matrix Computations for Register Reuse in SPARSITY
Eun-Jin Im, Katherine Yelick. 127
Rescheduling for Locality in Sparse Matrix Computations
Michelle Mills Strout, Larry Carter, Jeanne Ferrante. 137

Climate Modeling
The DOE Parallel Climate Model (PCM): The Computational Highway and Backroads
Thomas Bettge, Anthony Craig, Rodney James, Vince Wayland, Gary Strand. 149
Conceptualizing a Collaborative Problem-Solving Environment for Regional Climate Modeling and Assessment of Climate Impacts
George Chin Jr., L. Ruby Leung, Karen Schuchardt, Debbie Gracio. 159
Computational Design and Performance of the Fast Ocean Atmosphere Model, Version 1
Robert Jacob, Chad Schafer, Ian Foster, Michael Tobis, John Anderson. 175
The Model Coupling Toolkit
J. Walter Larson, Robert L. Jacob, Ian T. Foster, Jing Guo. . . 185
Parallelization of a Subgrid Orographic Precipitation Scheme in an MM5-based Regional Climate Model
L. Ruby Leung, John G. Michalakes, Xindi Bian. 195
Resolution Dependence in Modeling Extreme Weather Events
John Taylor, Jay Larson. 204
Visualizing High-Resolution Climate Data
Sheri A. Voelz, John Taylor. 212

Global Computing – Internals and Usage
Improving Java Server Performance with Interruptlets
David Craig, Steven Carroll, Fabian Breg, Dimitrios S. Nikolopoulos, Constantine Polychronopoulos. 223
Protocols and Software for Exploiting Myrinet Clusters
P. Geoffray, C. Pham, L. Prylli, B. Tourancheau, R. Westrelin. 233
Cluster Configuration Aided by Simulation
Dieter F. Kvasnicka, Helmut Hlavacs, Christoph W. Ueberhuber. 243

Application Monitoring in the Grid with GRM and PROVE
Zoltán Balaton, Péter Kacsuk, Norbert Podhorszki. 253
Extension of Macrostep Debugging Methodology Towards Metacomputing Applications
Robert Lovas, Vaidy S. Sunderam. 263
Capacity and Capability Computing Using Legion
Anand Natrajan, Marty A. Humphrey, Andrew S. Grimshaw. . . 273
Component Object Based Single System Image Middleware for Metacomputer Implementation of Genetic Programming on Clusters
Ivan Tanev, Takashi Uozomi, Dauren Akhmetov. 284
The Prioritized and Distributed Synchronization in Distributed Groups
Michel Trehel, Ahmed Housni. 294

Collaborative Computing

On Group Communication Systems: Insight, a Primer and a Snapshot
P.A. Gray, J.S. Pascoe. 307
Overview of the InterGroup Protocols
K. Berket, D.A. Agarwal, P.M. Melliar-Smith, L.E. Moser. . . . 316
Introducing Fault-Tolerant Group Membership into the Collaborative Computing Transport Layer
R.J. Loader, J.S. Pascoe, V.S. Sunderam. 326
A Modular Collaborative Parallel CFD Workbench
Kwai L. Wong, A. Jerry Baker. 336
Distributed Name Service in Harness
Tomasz Tyrakowski, Vaidy S. Sunderam, Mauro Migliardi. 345
Fault Tolerant MPI for the Harness Meta-computing System
Graham E. Fagg, Antonin Bukovsky, Jack J. Dongarra. 355
A Harness Control Application for Hand-Held Devices
Tomasz Tyrakowski, Vaidy S. Sunderam, Mauro Migliardi. 367
Flexible Class Loader Framework: Sharing Java Resources in Harness System
Dawid Kurzyniec, Vaidy S. Sunderam. 375
Mobile Wide Area Wireless Fault-Tolerance
J.S. Pascoe, G. Sibley, V.S. Sunderam, R.J. Loader. 385
Tools for Collaboration in Metropolitan Wireless Networks
G. Sibley, V.S. Sunderam. 395
A Repository System with Secure File Access for Collaborative Environments
Paul A. Gray, Srividya Chandramohan, Vaidy S. Sunderam. . . . 404
Authentication Service Model Supporting Multiple Domains in Distributed Computing
Kyung-Ah Chang, Byung-Rae Lee, Tai-Yun Kim. 413
Performance and Stability Analysis of a Message Oriented Reliable Multicast for Distributed Virtual Environments in Java
Gunther Stuer, Jan Broeckhove, Frans Arickx 423

A Secure and Efficient Key Escrow Protocol for Mobile Communications
Byung-Rae Lee, Kyung-Ah Chang, Tai-Yun Kim. 433

Complex Physical System Simulation

High-Performance Algorithms for Quantum Systems Evolution
Alexander V. Bogdanov, Ashot S. Gevorkyan, Elena N. Stankova. 447

Complex Situations Simulation when Testing Intelligence System Knowledge Base
Yu. I. Nechaev, A.B. Degtyarev, A.V. Boukhanovsky. 453

Peculiarities of Computer Simulation and Statistical Representation of Time-Spatial Metocean Fields
A.V. Boukhanovsky, A.B. Degtyarev, V.A. Rozhkov. 463

Numerical Investigation of Quantum Chaos in the Problem of Multichannel Scattering in Three Body System
A.V. Bogdanov, A.S. Gevorkyan, A.A. Udalov. 473

Distributed Simulation of Amorphous Hydrogenated Silicon Films: Numerical Experiments on a Linux Based Computing Environment
Yu.E. Gorbachev, M.A. Zatevakhin, V.V. Krzhizhanovskaya, A.A. Ignatiev, V. Kh. Protopopov, N.V. Sokolova, A.B. Witenberg. 483

Performance Prediction for Parallel Local Weather Forecast Programs
Wolfgang Joppich, Herrmann Mierendorff 492

The NORMA Language Application to Solution of Strong Nonequilibrium Transfer Processes Problem with Condensation of Mixtures on the Multiprocessors System
A.N. Andrianov, K.N. Efimkin, V. Yu. Levashov, I.N. Shishkova. 502

Adaptive High-Performance Method for Numerical Simulation of Unsteady Complex Flows with Number of Strong and Weak Discontinuities
Alexander Vinogradov, Vladimir Volkov, Vladimir Gidaspov, Alexander Muslaev, Peter Rozovski. 511

Cellular Automata as a Mesoscopic Approach to Model and Simulate Complex Systems
P.M.A. Sloot, A.G. Hoekstra. 518

Computational Chemistry

Ab-Initio Kinetics of Heterogeneous Catalysis: NO +N+ O/Rh(111)
A.P.J. Jansen, C.G.M. Hermse, F. Frechard, J.J. Lukkien. . . . 531

Interpolating Wavelets in Kohn-Sham Electronic Structure Calculations
A.J. Markvoort, R. Pino, P.A.J. Hilbers. 541

Simulations of Surfactant-Enhanced Spreading
Sean McNamara, Joel Koplik, Jayanth R. Banavar. 551

Supporting Car-Parrinello Molecular Dynamics Application with UNICORE
Valentina Huber. 560
Parallel Methods in Time Dependent Approaches to Reactive Scattering Calculations
Valentina Piermarini, Leonardo Pacifici, Stefano Crocchianti, Antonio Laganà, Giuseppina D'Agosto, Sergio Tasso. 567

Computational Finance
Construction of Multinomial Lattice Random Walks for Optimal Hedges
Yumi Yamada, James A. Primbs. 579
On Parallel Pseudo-random Number Generation
Chih Jeng Kenneth Tan. 589
A General Framework for Trinomial Trees
Ali Lari-Lavassani, Bradley D. Tifenbach. 597
On the Use of Quasi-Monte Carlo Methods in Computational Finance
Christiane Lemieux, Pierre L'Ecuyer. 607

Computational Geometry and Applications
An Efficient Algorithm to Calculate the Minkowski Sum of Convex 3D Polyhedra
Henk Bekker, Jos B.T.M. Roerdink. 619
REGTET: A Program for Computing Regular Tetrahedralizations
Javier Bernal. 629
Fast Maintenance of Rectilinear Centers
Sergei Bespamyatnikh, Michael Segal. 633
Exploring an Unknown Polygonal Environment with Bounded Visibility
Amitava Bhattacharya, Subir Kumar Ghosh, Sudeep Sarkar. 640
Parallel Optimal Weighted Links
Ovidiu Daescu. 649
Robustness Issues in Surface Reconstruction
Tamal K. Dey, Joachim Giesen, Wulue Zhao. 658
On a Nearest-Neighbor Problem in Minkowski and Power Metrics
M.L. Gavrilova. 663
On Dynamic Generalized Voronoi Diagrams in the Euclidean Metric
M.L. Gavrilova, J. Rokne. 673
Computing Optimal Hatching Directions in Layered Manufacturing
Man Chung Hon, Ravi Janardan, Jörg Schwerdt, Michiel Smid. . . 683
Discrete Local Fairing of B-spline Surfaces
Seok-Yong Hong, Chung-Seong Hong, Hyun-Chan Lee, Koohyun Park. 693
Computational Methods for Geometric Processing Applications to Industry
Andrés Iglesias, Akemi Gálvez, Jaime Puig-Pey. 698

Graph Voronoi Regions for Interfacing Planar Graphs
Thomas Kämpke, Matthias Strobel. 708
Robust and Fast Algorithm for a Circle Set Voronoi Diagram in a Plane
Deok-Soo Kim, Donguk Kim, Kokichi Sugihara, Joonghyun Ryu. 718
Apollonius Tenth Problem as a Point Location Problem
Deok-Soo Kim, Donguk Kim, Kokichi Sugihara, Joonghyun Ryu. 728
Crystal Voronoi Diagram and Its Applications to Collision-Free Paths
Kei Kobayashi, Kokichi Sugihara. 738
The Voronoi-Delaunay Approach for Modeling the Packing of Balls in a Cylindrical Container
V.A. Luchnikov, N.N. Medvedev, M.L. Gavrilova. 748
Multiply Guarded Guards in Orthogonal Art Galleries
T.S. Michael, Val Pinciu. 753
Reachability on a Region Bounded by Two Attached Squares
Ali Mohades, Mohammadreza Razzazi. 763
Illuminating Polygons with Vertex π-floodlights
Csaba D. Tóth. 772

Computational Methods

Performance Tradeoffs in Multi-tier Formulation of a Finite Difference Method
Scott B. Baden, Daniel Shalit. 785
On the Use of a Differentiated Finite Element Package for Sensitivity Analysis
Christian H. Bischof, H. Martin Bücker, Bruno Lang, Arno Rasch, Jakob W. Risch. 795
Parallel Factorizations with Algorithmic Blocking
Jaeyoung Choi. 802
Bayesian Parameter Estimation: A Monte Carlo Approch
Ray Gallagher, Tony Doran. 812
Recent Progress in General Sparse Direct Solvers
Anshul Gupta. 823
On Efficient Application of Implicit Runge-Kutta Methods to Large-Scale Systems of Index 1 Differential-Algebraic Equations
Gennady Yu. Kulikov, Alexandra A. Korneva. 832
On the Efficiency of Nearest Neighbor Searching with Data Clustered in Lower Dimensions
Songrit Maneewongvatana, David M. Mount. 842
A Spectral Element Method for Oldroyd-B Fluid in a Contraction Channel
Sha Meng, Xin Kai Li, Gwynne Evans. 852
SSE Based Parallel Solution for Power Systems Network Equations
Y.F. Fung, M. Fikret Ercan, T.K. Ho, W.L. Cheung. 862

Implementation of Symmetric Nonstationary Phase-Shift Wavefield Extrapolator on an Alpha Cluster
Yanpeng Mi, Gary F. Margrave. 874
Generalized High-Level Synthesis of Wavelet-Based Digital Systems via Nonlinear I/O Data Space Transformations
Dongming Peng, Mi Lu. 884
Solvable Map Method for Integrating Nonlinear Hamiltonian Systems
Govindan Rangarajan, Minita Sachidanand. 894
A Parallel ADI Method for a Nonlinear Equation Describing Gravitational Flow of Ground Water
I.V. Schevtschenko. 904
The Effect of the Cusp on the Rate of Convergence of the Rayleigh-Ritz Method
Ioana Sîrbu, Harry F. King. 911
The AGEB Algorithm for Solving the Heat Equation in Three Space Dimensions and Its Parallelization Using PVM
Mohd Salleh Sahimi, Norma Alias, Elankovan Sundararajan. . . 918
A Pollution Adaptive Mesh Generation Algorithm in r-h Version of the Finite Element Method
Soo Bum Pyun, Hyeong Seon Yoo. 928
An Information Model for the Representation of Multiple Biological Classifications
Neville Yoon, John Rose. 937
A Precise Integration Algorithm for Matrix Riccati Differential Equations
Wan-Xie Zhong, Jianping Zhu. 947

Computational Models of Natural Language Arguments
GEA: A Complete, Modular System for Generating Evaluative Arguments
Guiseppe Carenini. 959
Argumentation in Explanations to Logical Problems
Armin Fiedler, Helmut Horacek. 969
Analysis of the Argumentative Effect of Evaluative Semantics in Natural Language
Serge V. Gavenko. 979
Getting Good Value: Facts, Values and Goals in Computational Linguistics
Michael A. Gilbert. 989
Computational Models of Natural Language Argument
Chris Reed, Floriana Grasso. 999
An Empirical Study of Multimedia Argumentation
Nancy Green. 1009
Exploiting Uncertainty and Incomplete Knowledge in Deceptive Argumentation
Valeria Carofiglio, Fiorella de Rosis. 1019

Computational Physics in the Undergraduate Curriculum

Integrating Computational Science into the Physics Curriculum
Harvey Gould, Jan Tobochnik 1031

Musical Acoustics and Computational Science
N. Giordano, J. Roberts 1041

Developing Components and Curricula for a Research-Rich Undergraduate Degree in Computational Physics
Rubin H. Landau 1051

Physlets: Java Tools for a Web-Based Physics Curriculum
Wolfgang Christian, Mario Belloni, Melissa Dancy 1061

Computation in Undergraduate Physics: The Lawrence Approach
David M. Cook 1074

Computational Science Applications and Case Studies

Recent Developments of a Coupled CFD/CSD Methodology
Joseph D. Baum, Hong Luo, Eric L. Mestreau, Dmitri Sharov, Rainald Löhner, Daniele Pelessone, Charles Charman 1087

Towards a Coupled Environmental Prediction System
Julie L. McClean, Wieslaw Maslowski, Mathew E. Maltrud. . . . 1098

New Materials Design
Jerry Boatz, Mark S. Gordon, Gregory Voth, Sharon Hammes-Shiffer, Ruth Pachter 1108

Parallelization of an Adaptive Mesh Refinement Method for Low Mach Number Combustion
Charles A. Rendleman, Vince E. Beckner, Mike J. Lijewski. . . . 1117

Combustion Dynamics of Swirling Turbulent Flames
Suresh Menon, Vaidyanathan Sankaran, Christopher Stone. . . . 1127

Parallel CFD Computing Using Shared Memory OpenMP
Hong Hu, Edward L. Turner 1137

Plasma Modeling of Ignition for Combustion Simulations
Osman Yaşar 1147

Computational Science Education: Standards, Learning Outcomes and Assessment Techniques

Computational Science Education: Standards, Learning Outcomes and Assessment
Osman Yaşar 1159

Learning Computational Methods for Partial Differential Equations from the Web
André Jaun, Johan Hedin, Thomas Johnson, Michael Christie, Lars-Erik Jonsson, Mikael Persson, Laurent Villard 1170

Computational Engineering and Science Program at the University of Utah
Carleton DeTar, Aaron L. Fogelson, Christopher R. Johnson, Christopher A. Sikorski 1176

High Performance and Parallel Computing in Manufacturing and Testing Environments

Influences on the Solution Process for Large, Numeric-Intensive Automotive Simulations
Myron Ginsberg. 1189

Salable Large Scale Process Modeling and Simulations in Liquid Composite Molding
Ram Mohan, Dale Shires, Andrew Mark. 1199

An Object-Oriented Software Framework for Execution of Real-Time, Parallel Algorithms
J. Brent Spears, Brett N. Gossage. 1209

A Multiagent Architecture Addresses the Complexity of Industry Process Re-engineering
John K. Debenham. 1219

Diagnosis Algorithms for a Symbolically Modeled Manufacturing Process
N. Rakoto-Ravalontsalama. 1228

Time-Accurate Turbine Engine Simulation in a Parallel Computing Environment: Part II - Software Alpha Test
M.A. Chappell, B.K. Feather. 1237

Monte Carlo Numerical Methods

Finding Steady State of Safety Systems Using the Monte Carlo Method
Ray Gallagher. 1253

Parallel High-Dimensional Integration: Quasi Monte-Carlo versus Adaptive Cubature Rules
Rudolf Schürer. 1262

Path Integral Monte Carlo Simulations and Analytical Approximations for High-Temperature Plasmas
V. Filinov, M. Bonitz, D. Kremp, W.-D. Kraeft, V. Fortov. . . . 1272

A Feynman-Kac Path-Integral Implementation for Poisson's Equation
Chi-Ok Hwang, Michael Mascagni. 1282

Relaxed Monte Carlo Linear Solver
Chih Jeng Kenneth Tan, Vassil Alexandrov. 1289

Author Index 1299

http://www.springer.com/978-3-540-42232-7

Computational Science — ICCS 2001
International Conference San Francisco, CA, USA, May 28–30, 2001 Proceedings, Part I
Alexandrov, V.N.; Dongarra, J.J.; Juliano, B.A.; Renner, R.S.; Tan, C.J.K. (Eds.)
2001, LVI, 1305 p. 301 illus. In 2 volumes, not available separately., Softcover
ISBN: 978-3-540-42232-7