

CONTENTS

| | |
|--|-----|
| Preface | v |
| (I) General Overview | |
| Climate Simulations <i>J. M. Oberhuber</i> | 1 |
| Some Fundamental Aspects of Numerical Flow Simulation <i>E. Krause</i> | 11 |
| First Principle Calculations in Particle Physics <i>E. Laermann</i> | 24 |
| Multiscale Aspects of the Visual System and Their Use for Scale Invariant Object Recognition <i>N. Petkov and J. van Deemter</i> | 37 |
| Self-Organized Criticality <i>M. Creutz</i> | 49 |
| Simulations of Granular Media <i>H. J. Herrmann</i> | 59 |
| Phase Transitions in the Early Universe <i>Z. Fodor</i> | 70 |
| The CP-PACS Parallel Computer Project <i>Y. Iwasaki</i> | 80 |
| The APEmille Parallel Processor: An overview <i>R. Tripiccione</i> | 91 |
| (II) Simulation of Polymers and Proteins | |
| Simulation of Phase Transitions in Polymer Systems <i>K. Binder, M. Müller and N.B. Wilding</i> | 100 |
| Simulation of Peptides and Proteins in Generalized Ensembles <i>U. H. E. Hansmann</i> | 114 |

| | |
|--|-----|
| Simulating Crystalline Membranes | 119 |
| <i>G. Thorleifsson, M. Bowick, S. Catterall, M. Falcioni and K. Anagnostopoulos</i> | |
| New Parallel Genetic Algorithm Based on Molecular Dynamics Approach for Energy Minimization of Atomistic Systems; Implementation on a SIMD-MIMD Platform | 124 |
| <i>N. Pucello, M. Rosati, G. D'Agostino, F. Pisacane, V. Rosato and M. Celino</i> | |
| Molecular Dynamics with APE | 129 |
| <i>G. La Penna, V. Minicozzi, S. Morante, G. C. Rossi and G. Salina</i> | |
| Algorithms for the Simulation of Polymers | 136 |
| <i>A. D. Sokal</i> | |
| A Brief Review of Multicanonical Simulations | 137 |
| <i>B. A. Berg</i> | |
| Multicanonical Multigrid and Multibondic Algorithms | 147 |
| <i>W. Janke</i> | |
| How to Calculate the Mass-Gap in the D=2 $O(3)$ Non-linear Sigma Model? | 157 |
| <i>T. Neuhaus</i> | |
| Cluster Diagnosis of Phase Transition in Q-State Potts Model | 164 |
| <i>T. Çelik, Y. Gündüç and M. Aydın</i> | |
| (III) Simulation in Particle Physics | |
| Fermionic Monte Carlo Algorithms for Lattice QCD | 169 |
| <i>Ph. de Forcrand</i> | |
| Aspects of Fermion Simulation Algorithms | 179 |
| <i>K. Jansen</i> | |
| Irreversibility of Molecular Dynamics Trajectories: Will Chaos Destroy HMC? | 184 |
| <i>R.G. Edwards, I. Horváth and A.D. Kennedy</i> | |

| | |
|---|-----|
| Reducing Discretization Errors in Lattice QCD Spectroscopy <i>S. Collins, R. G. Edwards, U. M. Heller and J. Sloan</i> | 189 |
| Improved Quark Actions for Lattice QCD <i>T. R. Klassen</i> | 196 |
| Full QCD with Wilson Fermions: Recent Results from the SESAM Collaboration <i>N. Eicker, U. Glässner, S. Güsken, H. Hoerber, Th. Lippert, G. Ritzenhöfer, K. Schilling, G. Siegert, A. Spitz, P. Ueberholz and J. Viehoff</i> | 203 |
| Anisotropic Lattice for Finite Temperature QCD <i>QCD-TARO: M. Fujisaki, M. Okuda, Y. Tago, T. Hashimoto, S. Hioki, H. Matsufuru, O. Miyamura, A. Nakamura, Ph. de Forcrand, T. Takaishi, M. García Pérez and I.-O. Stamatescu</i> | 208 |
| Eigenvalue Calculations and QCD at Finite Density <i>I. M. Barbour, S. E. Morrison and J. B. Kogut</i> | 212 |
| Interface Tension with Lattice Monte Carlo <i>K. Rummukainen</i> | 222 |
| Faster Fermions in the Tempered Hybrid Monte Carlo Algorithm <i>G. Boyd</i> | 227 |
| Computer Aided Series Expansions for Critical Phenomena <i>H. Meyer-Ortmanns and Th. Reisz</i> | 232 |
| (IV) Hydrodynamic Simulations | |
| Numerical Turbulence Simulation at Moderate Reynolds Numbers Using the Sparse Grid Combination Method <i>W. Huber</i> | 240 |
| Efficient and Reliable Solution of Multi-Dimensional Radiative Transfer Problems <i>G. Kanschat</i> | 245 |

| | |
|--|-----|
| A Mesoscopic Model for Simulating the Combined Effect of Hydrodynamics and Diffusion on Nutrient Driven Growth Processes <i>J. A. Kaandorp and P. M. A. Sloot</i> | 250 |
| (V) Software Aspects | |
| Load Balancing Strategies for Distributed Memory Machines <i>R. Diekmann, B. Monien and R. Preis</i> | 255 |
| Software Engineering Methods for Parallel and Distributed Applications in Scientific Computing <i>A. Bode</i> | 267 |
| Scientific Applications on the SB-PRAM <i>A. Formella, Th. Grün, W. Paul, G. Rünger, J. Keller and Th. Rauber</i> | 272 |
| Systolic and Hyper-systolic Algorithms for N^2 -Problems and Matrix Multiplication <i>Th. Lippert</i> | 282 |
| Parallel Sparse Cholesky Factorization <i>J. Schulze</i> | 292 |
| List of Participants | 297 |