

Contents

I Fluid Flow

On the Realistic Performance of Linear Algebra Components in Iterative Solvers	3
<i>M. Altieri, Chr. Becker, S. Turek</i>	
Applying the Checkpointing Routine <code>treeverse</code> to Discretizations of Burgers' Equation.....	13
<i>A. Walther, A. Griewank</i>	
Adaptive Grids for Time Dependent Conservation Laws: Theory and Applications in CFD	25
<i>A. Egelja, D. Kröner, R. Schwörer</i>	
Numerical Bifurcation Analysis of Premixed Combustion in Porous Inert Media	39
<i>M. de Neef, P. Knabner, G. Summ</i>	
Multigrid Solution of the Incompressible Navier-Stokes Equations and its Application to Parallel Computers.....	51
<i>B. Huurdeman, S. Nägele, V. Reichenberger, H. Rentz-Reichert</i>	
Simulation of Internal and Free Turbulent Flows	61
<i>M. Meinke, Th. Rister, F. Rütten, A. Schworak</i>	
Application of Parallel Numerical Flow Solvers Invoking Advanced Turbulence-Transport Models to Aircraft Components	81
<i>M. Franke, Th. Rung, L. Xue, F. Thiele</i>	
Solution of Coupled Problems by Parallel Multigrid	91
<i>U. Becker-Lemgau, M. G. Hackenberg, W. Joppich, S. Mijalković, B. Steckel, Th. Sontowski, R. Tilch</i>	
Coupled Numerical Computations of the Fluid Damped Oscillations of a Lamina	103
<i>H. Dütsch, A. Melling, F. Durst</i>	
Efficient Treatment of Complicated Geometries and Moving Interfaces for CFD Problems	113
<i>H.-J. Bungartz, A. Frank, F. Meier, T. Neunhoffer, S. Schulte</i>	

II Dynamic Systems and Optimal Control

Very Low Thrust Trajectory Optimization	127
<i>J. T. Betts</i>	
Mechanical Multibody Systems with Deformable Components	143
<i>P. Rentrop, O. Scherf, B. Simeon</i>	
Real Time Simulation and Online Control for Virtual Test Drives of Cars	157
<i>C. Chucholowski, M. Vögel, O. von Stryk, T.-M. Wolter</i>	
Numerical Simulation of Vibrations for the Design of a Rear Axle	167
<i>D. Tscharnuter</i>	
Flight Tests with Computer Generated Synthetic Vision	177
<i>G. Sachs, P. Hermle, W. Klöckner</i>	
Flight Path Optimization with a New Homotopy Method for Reducing Safety Hazards in Microbursts	189
<i>E. Grigat, G. Sachs</i>	
Integrated User Environment for the Numerical Solution of Optimal Control Problems	199
<i>R. Mehlhorn, G. Sachs</i>	
Simulation and Optimization of Logistic Processes Involving Sloshing Media	209
<i>H. Leonpacher, S. S. Douglas, N. H. Woolley, D. Kraft</i>	
Numerical Simulation and Optimal Control of Air Separation Plants ..	221
<i>G. Engl, A. Kröner, Th. Kronseder, O. von Stryk</i>	
Advanced Extrapolation Methods for Large Scale Differential Algebraic Problems	233
<i>R. Ehrig, U. Nowak, L. Oeverdieck, P. Deuflhard</i>	

III Melting, Coating, and Crystal Growth

On the Generation and Spreading of 'Finger' Instabilities in Film Coat- ing Processes	245
<i>K.-H. Hoffmann, B. Wagner, A. Münch</i>	
CrysVUN++, a Powerful Computer Code for Global Thermal Mod- elling of Industrial Crystal Growth Processes	255
<i>M. Kurz, A. Pusztai, G. Müller</i>	

3D Adaptive Unstructured Grid Solver: Application to Flow and GaAs Deposition in the Planetary Reactor TM	267
<i>Yu. E. Egorov, A. O. Galyukov, A. I. Zhmakin</i>	
Direct Navier-Stokes Simulations of Turbulent Czochralski Flows	279
<i>C. Wagner</i>	
<hr/>	
IV Semiconductors and Circuits	
<hr/>	
Advanced Models, Applications, and Software Systems for High Per- formance Computing – Application in Microelectronics	291
<i>E. Langer, S. Selberherr</i>	
Numerical Simulation of Microstructured Semiconductor Devices, Trans- ducers, and Systems	309
<i>St. Dürndorfer, V. Gradinaru, R.H.W. Hoppe, E.-R. König, G. Schrag, G. Wachutka</i>	
Parallel Multigrid Methods for the Continuity Equations in Semicon- ductor Device Simulation	325
<i>K. Gärtner, O. Schenk, W. Fichtner</i>	
Partitioning Strategies in Circuit Simulation	343
<i>M. Günther, M. Hoschek</i>	
A New Stochastic Integration Scheme for the Efficient Solution of Ran- domly Disturbed Circuits	353
<i>Chr. Penski, G. Denk</i>	
Eigenvalue Solvers for Electromagnetic Fields in Cavities	363
<i>P. Arbenz, R. Geus</i>	
Remarks on the Convex Analysis of the Energy Model of Semiconductor Devices	375
<i>G. Albinus</i>	
Analysis of Electromechanical Microdevices Using Coupled FEM-BEM Based on the TP2000 CAD Platform	387
<i>E.-R. König, P. Groth, G. Wachutka</i>	
Numerical Analysis of Distributed Inductive Parasitics in High Power Bus Bars	397
<i>P. Böhm, E. Falck, J. Sigg, G. Wachutka</i>	

Low Pressure Discharges in Plasma Reactors: Modelling and Computer-Aided Diagnostics 405
M. Kratzer, R. P. Brinkmann, P. Scheubert, P. Awakowicz, G. Wachutka

V HPSC in Physics and Chemistry

Numerical Fluid Dynamics in Astrophysics with Smoothed Particle Hydrodynamics 417
R. Speith, H. Riffert, H. Ruder

Parallel Computation of Multi-Dimensional Neutron and Photon Transport in Inhomogeneous Media 431
G. Kanschat

Quantum Chemistry on Parallel Computers: Concepts and Results of a Density Functional Method 441
Th. Belling, Th. Grauschopf, S. Krüger, M. Mayer, F. Nörtemann, M. Staufer, C. Zenger, N. Rösch

Future Trends in HPSC

Technological Trends and their Impact on the Future of Supercomputers 459
U. Rüde