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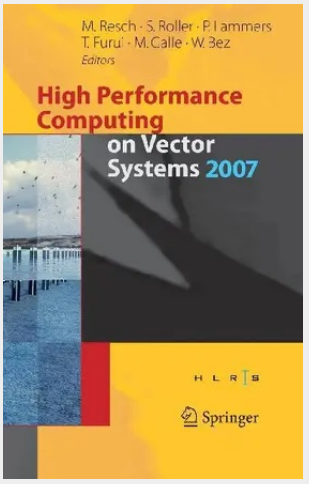
High Performance Computing on Vector Systems 2007



This book contains papers presented at the fifth and sixth Teraflop Workshop. It presents the state-of-the-art in high performance computing and simulation on modern supercomputer architectures. It covers trends in hardware and software development in general and specifically the future of vector-based systems and heterogeneous architectures. It covers computational fluid dynamics, fluid-structure interaction, physics, chemistry, astrophysics, and climate research.

Geophysics and Climate Simulations.- Sustained Performance of 10+ Teraflop/s in Simulation on Seismic Waves Using 507 Nodes of the Earth Simulator.- Cloud-Resolving Simulation of Tropical Cyclones.- OPA9 - French Experiments on the Earth Simulator and Teraflop Workbench Tunings.- TERAFLOP Computing and Ensemble Climate Model Simulations.- Computational Fluid Dynamics.- Current Capability of Unstructured-Grid CFD and a Consideration for the Next Step.- Smart Suction - an Advanced Concept for Laminar Flow Control of Three-Dimensional Boundary Layers.- Supercomputing of Flows with Complex Physics and the Future Progress.- Large-Scale Computations of Flow Around a Circular Cylinder.- Performance Assessment and Parallelisation Issues of the CFD Code NSMB.- Multiphysics Computational Fluid Dynamics.- High Performance Computing Towards Silent Flows.- Fluid-Structure Interaction: Simulation of a Tidal Current Turbine.- Coupled Problems in Computational Modeling of the Respiratory System.- FSI Simulations on Vector Systems - Development of a Linear Iterative Solver (BLIS).- Chemistry and Astrophysics.- Simulations of Premixed Swirling Flames Using a Hybrid Finite-Volume/Transported PDF Approach.- Supernova Simulations with the Radiation Hydrodynamics Code PROMETHEUS/VERTEX.- Material Science.- Green Chemistry from Supercomputers: Car-Parrinello Simulations of Emim-Chloroaluminates Ionic Liquids.- Micromagnetic Simulations of Magnetic Recording Media.- Future High Performance Systems.- The Potential of On-Chip Memory Systems for Future Vector Architectures.- The Road to TSUBAME and Beyond.

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