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Titolo	Numerical Computations with GPUs / / edited by Volodymyr Kindratenko
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Descrizione fisica	1 online resource (404 p.)
Disciplina	006.663
Soggetti	Numerical analysis Computer programming Computer architecture Applied mathematics Engineering mathematics Programming languages (Electronic computers) Numeric Computing Programming Techniques Computer System Implementation Mathematical and Computational Engineering Programming Languages, Compilers, Interpreters
Lingua di pubblicazione	Inglese
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Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Accelerating Numerical Dense Linear Algebra Calculations with GPUs -- A Guide to Implement Tridiagonal Solvers on GPUs -- Batch Matrix Exponentiation -- Efficient Batch LU and QR Decomposition on GPU -- A Flexible CUDA LU-Based Solver for Small, Batched Linear Systems -- Sparse Matrix-Vector Product -- Solving Ordinary Differential Equations on GPUs -- GPU-based integration of large numbers of independent ODE systems -- Finite and spectral element methods on unstructured grids for flow and wave propagation problems -- A GPU implementation for solving the Convection Diffusion equation using the Local Modified SOR method -- Pseudorandom numbers generation for Monte Carlo simulations on GPUs: Open CL approach -- Monte Carlo Automatic Integration with Dynamic Parallelism in CUDA -- GPU-

Accelerated computation routines for quantum trajectories method -- Monte Carlo Simulation of Dynamic Systems on GPUs -- Fast Fourier Transform (FFT) on GPUs -- A Highly Efficient FFT Using Shared-Memory Multiplexing -- Increasing parallelism and reducing thread contentions in mapping localized N-body simulations to GPUs.

Sommario/riassunto

This book brings together research on numerical methods adapted for Graphics Processing Units (GPUs). It explains recent efforts to adapt classic numerical methods, including solution of linear equations and FFT, for massively parallel GPU architectures. This volume consolidates recent research and adaptations, covering widely used methods that are at the core of many scientific and engineering computations. Each chapter is written by authors working on a specific group of methods; these leading experts provide mathematical background, parallel algorithms and implementation details leading to reusable, adaptable and scalable code fragments. This book also serves as a GPU implementation manual for many numerical algorithms, sharing tips on GPUs that can increase application efficiency. The valuable insights into parallelization strategies for GPUs are supplemented by ready-to-use code fragments. Numerical Computations with GPUs targets professionals and researchers working in high performance computing and GPU programming. Advanced-level students focused on computer science and mathematics will also find this book useful as secondary text book or reference.