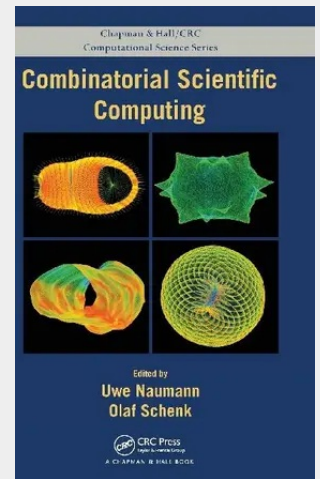


Combinatorial Scientific Computing

Combinatorial Scientific Computing explores the latest research on creating algorithms and software tools to solve key combinatorial problems on large-scale high-performance computing architectures. It includes contributions from international researchers who are pioneers in designing software and applications for high-performance computing systems. The book offers a state-of-the-art overview of the latest research, tool development, and applications. It focuses on load balancing and parallelization on high-performance computers, large-scale optimization, algorithmic differentiation of numerical simulation code, sparse matrix software tools, and combinatorial challenges and applications in large-scale social networks. The authors unify these seemingly disparate areas through a common set of abstractions and algorithms based on combinatorics, graphs, and hypergraphs. Combinatorial algorithms have long played a crucial enabling role in scientific and engineering computations and their importance continues to grow with the demands of new applications and advanced architectures. By addressing current challenges in the field, this volume sets the stage for the accelerated development and deployment of fundamental enabling technologies in high-performance scientific computing.

This is the first book to provide an overview of combinatorial scientific computing (CSC). Bringing together a diverse group of researchers, it addresses many of the challenges faced in high-performance computing (HPC) by setting the stage for accelerated development and deployment of fundamental enabling technologies in HPC. The text focuses on load balancing and parallelization on high-performance computers, large-scale optimization, automatic differentiation of numerical simulation code, and sparse matrix software tools. It also discusses key topics in CSC, important software tools, and special topics and applications.



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