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Mathematics : Computational Science and Engineering

Bader, Michael, Munich Center of Advanced Computing, Garching, Germany

Space-Filling Curves

An Introduction with Applications in Scientific Computing

- Connects the different techniques to describe space-filling curves to corresponding algorithms
- Connects space-filling curves and respective orders to regular and adaptive meshes for discretisation
- Describes parallelisation and cache-efficient algorithms based on space-filling curves
- Provides a section on references to both pioneering and current research on space-filling curves in scientific computing

-The present book provides an introduction to using space-filling curves (SFC) as tools in scientific computing. Special focus is laid on the representation of SFC and on resulting algorithms. For example, grammar-based techniques are introduced for traversals of Cartesian and octree-type meshes, and arithmetisation of SFC is explained to compute SFC mappings and indexings. - The locality properties of SFC are discussed in detail, together with their importance for algorithms. Templates for parallelisation and cache-efficient algorithms are presented to reflect the most important applications of SFC in scientific computing. Special attention is also given to the interplay of adaptive mesh refinement and SFC, including the structured refinement of triangular and tetrahedral grids. For each topic, a short overview is given on the most important publications and recent research activities.

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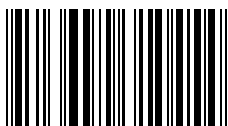
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