1. Record Nr. UNINA9911004742303321

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Titolo	Multigrid techniques : 1984 guide with applications to fluid dynamics / / Achi Brandt, Oren E. Livne
Pubbl/distr/stampa	Philadelphia, Pa., : Society for Industrial and Applied Mathematics (SIAM, 3600 Market Street, Floor 6, Philadelphia, PA 19104), 2011
ISBN	1-61197-075-X
Edizione	[Rev. ed.]
Descrizione fisica	1 electronic text (xxii, 218 p.) : digital file
Collana	Classics in applied mathematics ; ; 67
Altri autori (Persone)	LivneOren E
Disciplina	532/.05015182
Soggetti	Fluid dynamics - Mathematics Multigrid methods (Numerical analysis) Differential equations, Partial - Numerical solutions
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	List of figures -- List of tables -- Preface to Classics edition -- Preface -- Chapter 0. Introduction -- Chapter 1. Elementary acquaintance with Multigrid -- Part I. Stages in developing fast solvers. Chapter 2. Stable discretization -- Chapter 3. Interior relaxation and smoothing factors -- Chapter 4. Interior two-level cycles -- Chapter 5. Boundary conditions and two-level cycling -- Chapter 6. Many-level cycles -- Chapter 7. Full Multi-Grid (FMG) algorithms -- Part II. Advanced techniques and insights -- Chapter 8. Full approximation scheme (FAS) and applications -- Chapter 9. Local refinements and grid adaptation -- Chapter 10. Higher-order techniques -- Chapter 11. Coarsening guided by discretization -- Chapter 12. True role of relaxation -- Chapter 13. Dealgebraization of Multigrid -- Chapter 14. Practical role of rigorous analysis and quantitative predictions -- Chapter 15. Chains of problems. frozen [tau] -- Chapter 16. Time dependent problems -- Part II. Applications to fluid dynamics. Chapter 17. Cauchy-Riemann equations -- Chapter 18. Steady-state Stokes equations -- Chapter 19. Steady-state incompressible Navier-Stokes equations -- Chapter 20. Compressible Navier-Stokes and Euler equations -- Chapter 21. Remarks on solvers for transonic potential equations -- Appendix. Test cycle: MATLAB code -- Bibliography -- Index.

Sommario/riassunto

This classic text presents the best practices of developing multigrid solvers for large-scale computational problems in science and engineering. By representing a problem at multiple scales and employing suitable interscale interactions, multigrid avoids slowdown due to stiffness and reduces the computational cost of classical algorithms by orders of magnitude. Starting from simple examples, this book guides the reader through practical stages for developing reliable multigrid solvers, methodically supported by accurate performance predictors. The revised edition presents discretization and fast solution of linear and nonlinear partial differential systems; treatment of boundary conditions, global constraints and singularities; grid adaptation, high-order approximations, and system design optimization; applications to fluid dynamics, from simple models to advanced systems; new quantitative performance predictors, a MATLABÊ¼ sample code, and more. Readers will also gain access to the Multigrid Guide 2.0 Web site, where updates and new developments will be continually posted, including a chapter on Algebraic Multigrid.