1. Record Nr. UNINA9910449997103321

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Titolo	High-order methods for incompressible fluid flow / / M.O. Deville, P.F. Fischer, E.H. Mund [[electronic resource]]
Pubbl/distr/stampa	Cambridge : , : Cambridge University Press, , 2002
ISBN	1-107-11223-0 1-280-41675-0 9786610416752 0-511-17692-9 0-511-15780-0 0-511-30469-2 0-511-54679-3 0-511-09197-4 0-511-05284-7
Descrizione fisica	1 online resource (xxvii, 499 pages) : digital, PDF file(s)
Collana	Cambridge monographs on applied and computational mathematics ; ; 9
Disciplina	532/.051
Soggetti	Fluid dynamics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Title from publisher's bibliographic system (viewed on 05 Oct 2015).
Nota di bibliografia	Includes bibliographical references (p. 467-487) and index.
Nota di contenuto	Fluid Mechanics and Computation: An Introduction -- Viscous Fluid Flows -- Mass Conservation -- Momentum Equations -- Linear Momentum -- Angular Momentum -- Energy Conservation -- Thermodynamics and Constitutive Equations -- Fluid Flow Equations and Boundary Conditions -- Isothermal Incompressible Flow -- Thermal Convection: The Boussinesq Approximation -- Boundary and Initial Conditions -- Dimensional Analysis and Reduced Equations -- Vorticity Equation -- Simplified Models -- Turbulence and Challenges -- Numerical Simulation -- Hardware Issues -- Software Issues -- Algorithms -- Advantages of High-Order Methods -- Approximation Methods for Elliptic Problems -- Variational Form of Boundary-Value Problems -- Variational Functionals -- Boundary Conditions -- Sobolev Spaces and the Lax-Milgram Theorem -- An Approximation Framework -- Galerkin Approximations -- Collocation Approximation -- Finite-

Element Methods -- The h-Version of Finite Elements -- The p-Version of Finite Elements -- Spectral-Element Methods -- Orthogonal Collocation -- Orthogonal Collocation in a Monodomain -- Orthogonal Collocation in a Multidomain -- Error Estimation -- Solution Techniques -- The Conditioning of a Matrix -- Basic Iterative Methods -- Preconditioning Schemes of High-Order Methods -- Iterative Methods Based on Projection -- A Numerical Example -- Parabolic and Hyperbolic Problems -- Time Discretization Schemes -- Linear Multistep Methods -- Predictor-Corrector Methods -- Runge-Kutta Methods -- Splitting Methods.

Sommario/riassunto

High-order numerical methods provide an efficient approach to simulating many physical problems. This book considers the range of mathematical, engineering, and computer science topics that form the foundation of high-order numerical methods for the simulation of incompressible fluid flows in complex domains. Introductory chapters present high-order spatial and temporal discretizations for one-dimensional problems. These are extended to multiple space dimensions with a detailed discussion of tensor-product forms, multi-domain methods, and preconditioners for iterative solution techniques. Numerous discretizations of the steady and unsteady Stokes and Navier-Stokes equations are presented, with particular attention given to enforcement of incompressibility. Advanced discretizations, implementation issues, and parallel and vector performance are considered in the closing sections. Numerous examples are provided throughout to illustrate the capabilities of high-order methods in actual applications. Computer scientists, engineers and applied mathematicians interested in developing software for solving flow problems will find this book a valuable reference.