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| 1. Record Nr. | UNINA9910254213903321 |
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| Titolo | The Finite Volume Method in Computational Fluid Dynamics : An Advanced Introduction with OpenFOAM® and Matlab // by F. Moukalled, L. Mangani, M. Darwish |
| Pubbl/distr/stampa | Cham : , : Springer International Publishing : , : Imprint : Springer, , 2016 |
| ISBN | 3-319-16874-6 |
| Edizione | [1st ed. 2016.] |
| Descrizione fisica | 1 online resource (XXIII, 791 p. 297 illus., 242 illus. in color.) |
| Collana | Fluid Mechanics and Its Applications, , 0926-5112 ; ; 113 |
| Disciplina | 518.25 |
| Soggetti | Fluid mechanics Computer mathematics Physics Fluids Engineering Fluid Dynamics Computational Science and Engineering Numerical and Computational Physics, Simulation Fluid- and Aerodynamics |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Note generali | Bibliographic Level Mode of Issuance: Monograph |
| Nota di contenuto | Foundation -- 1 Introduction -- 2 Review of Vector Calculus -- 3 Mathematical Description of Physical Phenomena -- 4 The Discretization Process -- 5 The Finite Volume Method -- 6 The Finite Volume Mesh -- 7 The Finite Volume Mesh in OpenFOAM® and uFVM -- Discretization -- 8 Spatial Discretization: The Diffusion Term -- 9 Gradient Computation -- 10 Solving the System of Algebraic Equations -- 11 Discretization of the Convection Term -- 12 High Resolution Schemes -- 13 Temporal Discretization: The Transient Term -- 14 Discretization of the Source Term, Relaxation, and Other Details -- Algorithms -- 15 Fluid Flow Computation: Incompressible Flows -- 16 Fluid Flow Computation: Compressible Flows -- Applications -- 17 Turbulence Modeling -- 18 Boundary Conditions in OpenFOAM® and uFVM -- 19 An OpenFOAM® Turbulent Flow Application -- 20 Closing Remarks -- Appendices. |

This textbook explores both the theoretical foundation of the Finite Volume Method (FVM) and its applications in Computational Fluid Dynamics (CFD). Readers will discover a thorough explanation of the FVM numerics and algorithms used for the simulation of incompressible and compressible fluid flows, along with a detailed examination of the components needed for the development of a collocated unstructured pressure-based CFD solver. Two particular CFD codes are explored. The first is uFVM, a three-dimensional unstructured pressure-based finite volume academic CFD code, implemented within Matlab. The second is OpenFOAM®, an open source framework used in the development of a range of CFD programs for the simulation of industrial scale flow problems. With over 220 figures, numerous examples and more than one hundred exercise on FVM numerics, programming, and applications, this textbook is suitable for use in an introductory course on the FVM, in an advanced course on numerics, and as a reference for CFD programmers and researchers.
