

1. Record Nr.	UNINA9910789209903321
Autore	Fletcher Clive A.J
Titolo	Computational Techniques for Fluid Dynamics 1 [[electronic resource]] : Fundamental and General Techniques / / by Clive A.J. Fletcher
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Springer, , 1998
ISBN	3-642-58229-X
Edizione	[2nd ed. 1998.]
Descrizione fisica	1 online resource (XIII, 401 p. 2 illus.)
Collana	Scientific Computation, , 1434-8322
Altri autori (Persone)	SrinivasK <1946-> (Karkenahalli)
Disciplina	532.050151
Soggetti	Continuum physics Fluids Physics Computer mathematics Applied mathematics Engineering mathematics Fluid mechanics Classical and Continuum Physics Fluid- and Aerodynamics Numerical and Computational Physics, Simulation Computational Science and Engineering Mathematical and Computational Engineering Engineering Fluid Dynamics
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 at the end of each chapters and index.
Nota di contenuto	1. Computational Fluid Dynamics: An Introduction -- 1.1 Advantages of Computational Fluid Dynamics -- 1.2 Typical Practical Problems -- 1.3 Equation Structure -- 1.4 Overview of Computational Fluid Dynamics -- 1.5 Further Reading -- 2. Partial Differential Equations -- 2.1 Background -- 2.2 Hyperbolic Partial Differential Equations -- 2.3 Parabolic Partial Differential Equations -- 2.4 Elliptic Partial Differential Equations -- 2.5 Traditional Solution Methods -- 2.6 Closure -- 2.7 Problems -- 3. Preliminary Computational Techniques -- 3.1

Discretisation -- 3.2 Approximation to Derivatives -- 3.3 Accuracy of the Discretisation Process -- 3.4 Wave Representation -- 3.5 Finite Difference Method -- 3.6 Closure -- 3.7 Problems -- 4. Theoretical Background -- 4.1 Convergence -- 4.2 Consistency -- 4.3 Stability -- 4.4 Solution Accuracy -- 4.5 Computational Efficiency -- 4.6 Closure -- 4.7 Problems -- 5. Weighted Residual Methods -- 5.1 General Formulation -- 5.2 Finite Volume Method -- 5.3 Finite Element Method and Interpolation -- 5.4 Finite Element Method and the Sturm-Liouville Equation -- 5.5 Further Applications of the Finite Element Method -- 5.6 Spectral Method -- 5.7 Closure -- 5.8 Problems -- 6. Steady Problems -- 6.1 Nonlinear Steady Problems -- 6.2 Direct Methods for Linear Systems -- 6.3 Iterative Methods -- 6.4 Pseudotransient Method -- 6.5 Strategies for Steady Problems -- 6.6 Closure -- 6.7 Problems -- 7. One-Dimensional Diffusion Equation -- 7.1 Explicit Methods -- 7.2 Implicit Methods -- 7.3 Boundary and Initial Conditions -- 7.4 Method of Lines -- 7.5 Closure -- 7.6 Problems -- 8. Multidimensional Diffusion Equation -- 8.1 Two-Dimensional Diffusion Equation -- 8.2 Multidimensional Splitting Methods -- 8.3 Splitting Schemes and the Finite Element Method -- 8.4 Neumann Boundary Conditions -- 8.5 Method of Fractional Steps -- 8.6 Closure -- 8.7 Problems -- 9. Linear Convection-Dominated Problems -- 9.1 One-Dimensional Linear Convection Equation -- 9.2 Numerical Dissipation and Dispersion -- 9.3 Steady Convection-Diffusion Equation -- 9.4 One-Dimensional Transport Equation -- 9.5 Two-Dimensional Transport Equation -- 9.6 Closure -- 9.7 Problems -- 10. Nonlinear Convection-Dominated Problems -- 10.1 One-Dimensional Burgers' Equation -- 10.2 Systems of Equations -- 10.3 Group Finite Element Method -- 10.4 Two-Dimensional Burgers' Equation -- 10.5 Closure -- 10.6 Problems -- Appendix A.1 Empirical Determination of the Execution Time of Basic Operations -- A.2 Mass and Difference Operators -- References.

Sommario/riassunto

This well-known 2-volume textbook provides senior undergraduate and postgraduate engineers, scientists and applied mathematicians with the specific techniques, and the framework to develop skills in using the techniques in the various branches of computational fluid dynamics. A solutions manual to the exercises is in preparation.
