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Nota di contenuto	Front Cover; The Finite Element Method for Fluid Dynamics; Copyright Page; Contents; Preface; Acknowledgements; Chapter 1. Introduction to the equations of fluid dynamics and the finite element approximation; 1.1 General remarks and classification of fluid dynamics problems discussed in this book; 1.2 The governing equations of fluid dynamics; 1.3 Inviscid, incompressible flow; 1.4 Incompressible (or nearly incompressible) flows; 1.5 Numerical solutions: weak forms, weighted residual and finite element approximation; 1.6 Concluding remarks; References

Chapter 2. Convection dominated problems- finite element approximations to the convection-diffusion-reaction equation2.1 Introduction; 2.2 The steady-state problem in one dimension; 2.3 The steady-state problem in two (or three) dimensions; 2.4 Steady state - concluding remarks; 2.5 Transients - introductory remarks; 2.6 Characteristic-based methods; 2.7 Taylor-Galerkin procedures for scalar variables; 2.8 Steady-state condition; 2.9 Non-linear waves and shocks; 2.10 Treatment of pure convection; 2.11 Boundary conditions for convection-diffusion; 2.12 Summary and concluding remarks ReferencesChapter 3. The characteristic-based split (CBS) algorithm. A general procedure for compressible and incompressible flow; 3.1 Introduction; 3.2 Non-dimensional form of the governing equations; 3.3 Characteristic-based split (CBS) algorithm; 3.4 Explicit, semi-implicit and nearly implicit forms; 3.5 Artificial compressibility and dual time stepping; 3.6 'Circumvention' of the Babuska-Brezzi (BB) restrictions; 3.7 A single-step version; 3.8 Boundary conditions; 3.9 The performance of two-step and one-step algorithms on an inviscid problem; 3.10 Concluding remarks; References
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Chapter 6. Free surface and buoyancy driven flows6.1 Introduction; 6.2 Free surface flows; 6.3 Buoyancy driven flows; 6.4 Concluding remarks; References; Chapter 7. Compressible high-speed gas flow; 7.1 Introduction; 7.2 The governing equations; 7.3 Boundary conditions - subsonic and supersonic flow; 7.4 Numerical approximations and the CBS algorithm; 7.5 Shock capture; 7.6 Variable smoothing; 7.7 Some preliminary examples for the Euler equation; 7.8 Adaptive refinement and shock capture in Euler problems; 7.9 Three-dimensional inviscid examples in steady state
7.10 Transient two- and three-dimensional problems

Sommario/riassunto

Dealing with general problems in fluid mechanics, convection diffusion, compressible and incompressible laminar and turbulent flow, shallow water flows and waves, this is the leading text and reference for engineers working with fluid dynamics in fields including aerospace engineering, vehicle design, thermal engineering and many other engineering applications. The new edition is a complete fluids text and reference in its own right. Along with its companion volumes it forms part of the indispensable Finite Element Method series.New material in this edition includes sub-grid sca