1. Record Nr. UNINA9911046726203321

Autore	Taylor R. L
Titolo	The Finite Element Method for Fluid Dynamics
Pubbl/distr/stampa	Chantilly : , : Elsevier Science & Technology, , 2024 ©2025
ISBN	0-323-95887-7
Edizione	[8th ed.]
Descrizione fisica	1 online resource (598 pages)
Altri autori (Persone)	NithiarasuP
Disciplina	620.106
Soggetti	Fluid dynamics Finite element method
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Front Cover -- The Finite Element Method for Fluid Dynamics -- Copyright -- Contents -- List of figures -- List of tables -- Preface -- 1 The equations of fluid dynamics -- 1.1 General remarks and classification of fluid dynamics problems -- 1.2 The governing equations of fluid dynamics -- 1.2.1 Stresses in fluids -- 1.2.2 Constitutive relations for fluids -- 1.2.3 Mass conservation -- 1.2.4 Momentum conservation: dynamic equilibrium -- 1.2.5 Energy conservation and equation of state -- 1.2.6 Boundary conditions -- 1.2.7 Navier–Stokes and Euler equations -- 1.3 Inviscid, incompressible flow -- 1.3.1 Velocity potential solution -- 1.4 Incompressible (or nearly incompressible) flows -- 1.5 Concluding remarks -- References -- 2 The finite element approximation -- 2.1 Introduction -- 2.2 Numerical solutions: weak forms, weighted residual and finite element approximation -- 2.2.1 Strong and weak forms -- 2.2.1.1 Weak form of equations -- 2.2.1.2 Weighted residual approximation -- 2.2.1.3 The Galerkin, finite element, method -- 2.2.2 A finite volume approximation
Sommario/riassunto	This book, 'The Finite Element Method for Fluid Dynamics', authored by Olek C. Zienkiewicz, Robert L. Taylor, and P. Nithiarasu, provides a comprehensive exploration of the finite element method as applied to fluid dynamics. The text covers fundamental equations of fluid dynamics, numerical methods, and advanced topics such as

convection-dominated problems, turbulence modeling, compressible flows, and porous media. It is designed to serve as both a theoretical and practical guide, incorporating the latest developments in the field. The book is intended for researchers, practitioners, and graduate-level students in engineering and computational sciences, aiming to enhance understanding and application of finite element techniques in solving complex fluid dynamic problems.