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Autore	RELLICH, Franz
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Autore	Zienkiewicz O. C
Titolo	The finite element method : its basis and fundamentals / / O.C. Zienkiewicz, CBE, FRS, Previously UNESCO Professor of Numerical Methods in Engineering, International Centre for Numerical Methods in Engineering, Barcelona, Previously Director of the Institute for Numerical Methods in Engineering, University of Wales, Swansea, R.L. Taylor, Professor in the Graduate School, Department of Civil and Environmental Engineering, University of California at Berkeley, Berkeley, California, J.Z. Zhu, Senior Scientist, ESI US R & D, 9891 Broken Land Parkway, Suite 200, Columbia, Maryland
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Nota di bibliografia	Includes bibliographical references and indexes.
Nota di contenuto	Half Title; Author Biography; Title Page; Copyright; Dedication; Contents; List of Figures; List of Tables; Preface; 1 The Standard Discrete System and Origins of the Finite Element Method; 1.1 Introduction; 1.2 The structural element and the structural system; 1.3 Assembly and analysis of a structure; 1.4 The boundary conditions; 1.5 Electrical and fluid networks; 1.6 The general pattern; 1.7 The standard discrete system; 1.8 Transformation of coordinates; 1.9 Problems; References; 2 Problems in Linear Elasticity and Fields; 2.1 Introduction; 2.2 Elasticity equations 2.2.1 Displacement function2.2.2 Strain matrix; 2.2.2.1 Strain-displacement matrix; 2.2.2.2 Volume change and deviatoric strain; 2.2.3 Stress matrix; 2.2.3.1 Mean stress and deviatoric stress; 2.2.4 Equilibrium equations; 2.2.4.1 Plane stress and plane strain problems; 2.2.4.2 Axisymmetric problems; 2.2.5 Boundary conditions; 2.2.5.1 Boundary conditions on inclined coordinates; 2.2.5.2 Normal pressure loading; 2.2.5.3 Symmetry and repeatability; 2.2.6 Initial conditions; 2.2.7 Transformation of stress and strain; 2.2.7.1 Energy; 2.2.8 Stress-strain relations: Elasticity matrix 2.2.8.1 Isotropic materials2.2.8.2 Deviatoric and pressure-volume relations; 2.2.8.3 Anisotropic materials; 2.2.8.4 Initial strain-thermal effects; 2.3 General quasi-harmonic equation; 2.3.1 Governing equations: Flux and continuity; 2.3.2 Boundary conditions; 2.3.3 Initial condition; 2.3.4 Constitutive behavior; 2.3.5 Irreducible form in ; 2.3.6 Anisotropic and isotropic forms for k: Transformations; 2.3.7 Two-dimensional problems; 2.4 Concluding remarks; 2.5 Problems; References; 3 Weak Forms and Finite Element Approximation: 1-D Problems; 3.1 Weak forms 3.2 One-dimensional form of elasticity3.2.1 Weak form of equilibrium equation; 3.2.1.1 Adjoint forms; 3.3 Approximation to integral and weak forms: The weighted residual (Galerkin) method; 3.3.1 Galerkin solution of elasticity equation; 3.4 Finite element solution; 3.4.1 Requirements for finite element approximations; 3.5 Isoparametric form; 3.5.1 Higher order elements: Lagrange interpolation; 3.5.1.1 Linear shape functions; 3.5.1.2 Quadratic shape functions; 3.5.2 Integrals on the parent element: Numerical integration; 3.6 Hierarchical interpolation; 3.7 Axisymmetric one-dimensional problem 3.7.1 Weak form for axisymmetric problem3.7.2 A variational notation; 3.7.3 Irreducible form for axisymmetric problem; 3.7.4 Finite element solution; 3.8 Transient problems; 3.8.1 Discrete time methods; 3.8.1.1 Stability and dissipation; 3.8.2 Semi-discretization of the problem; 3.8.2.1 Stability of modes; 3.9 Weak form for one-dimensional quasi-harmonic equation; 3.9.1 Weak form; 3.9.2 Finite element solution of quasi-harmonic problem; 3.9.3 Transient problems; 3.9.3.1 Stability; 3.10 Concluding remarks; 3.11 Problems; References 4 Variational Forms and Finite Element Approximation: 1-D Problems
Sommario/riassunto	The Finite Element Method: Its Basis and Fundamentals offers a complete introduction to the basis of the finite element method, covering fundamental theory and worked examples in the detail required for readers to apply the knowledge to their own engineering problems and understand more advanced applications. This edition sees a significant rearrangement of the book's content to enable clearer development of the finite element method, with major new chapters

and sections added to cover: Weak forms Variational forms Multi-dimensional field prob