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Soggetti	Numerical analysis Differential equations, Partial Numerical Analysis Partial Differential Equations
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Note generali	Includes index.
Nota di contenuto	Preface -- Part I Finite differences and finite elements -- Elliptic partial differential equations -- Finite Element Method -- Part II Local resolution and iterative solution -- Local Resolution Techniques -- Iterative Solution Methods -- Part III Constrained and singularly perturbed problems -- Saddled-point Problems -- Mixed and Nonstandard methods -- Applications -- Problems and Projects -- Implementation aspects -- Notations, inequalities, guidelines -- Index .
Sommario/riassunto	Finite element methods for approximating partial differential equations have reached a high degree of maturity, and are an indispensible tool in science and technology. This textbook aims at providing a thorough introduction to the construction, analysis, and implementation of finite element methods for model problems arising in continuum mechanics. The first part of the book discusses elementary properties of linear partial differential equations along with their basic numerical approximation, the functional-analytical framework for rigorously establishing existence of solutions, and the construction and analysis of basic finite element methods. The second part is devoted to the optimal adaptive approximation of singularities and the fast iterative solution of linear systems of equations arising from finite element

discretizations. In the third part, the mathematical framework for analyzing and discretizing saddle-point problems is formulated, corresponding finte element methods are analyzed, and particular applications including incompressible elasticity, thin elastic objects, electromagnetism, and fluid mechanics are addressed. The book includes theoretical problems and practical projects for all chapters, and an introduction to the implementation of finite element methods.