1. Record Nr. UNINA9910437868303321

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Titolo	The Finite Element Method: Theory, Implementation, and Applications / / by Mats G. Larson, Fredrik Bengzon
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Springer, , 2013
ISBN	3-642-33287-0
Edizione	[1st ed. 2013.]
Descrizione fisica	1 online resource (401 p.)
Collana	Texts in Computational Science and Engineering, , 1611-0994 ; ; 10
Classificazione	004
Disciplina	518/.25
Soggetti	Computer mathematics Partial differential equations Mechanics Mechanics, Applied Computer-aided engineering Computational Science and Engineering Partial Differential Equations Theoretical and Applied Mechanics Computer-Aided Engineering (CAD, CAE) and Design Computational Mathematics and Numerical Analysis
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1. Piecewise Polynomial Approximation in 1D -- 2. The Finite Element Method in 1D -- 3. Piecewise Polynomial Approximation in 2D -- 4. The Finite Element Method in 2D -- 5. Time-dependent Problems -- 6. Solving Large Sparse Linear Systems -- 7. Abstract Finite Element Analysis -- 8. The Finite Element -- 9. Non-linear Problems -- 10. Transport Problems -- 11. Solid Mechanics -- 12. Fluid Mechanics -- 13. Electromagnetics -- 14. Discontinuous Galerkin Methods -- A. Some Additional Matlab Code -- References.
Sommario/riassunto	This book gives an introduction to the finite element method as a general computational method for solving partial differential equations approximately. Our approach is mathematical in nature with a strong focus on the underlying mathematical principles, such as approximation properties of piecewise polynomial spaces, and

variational formulations of partial differential equations, but with a minimum level of advanced mathematical machinery from functional analysis and partial differential equations. In principle, the material should be accessible to students with only knowledge of calculus of several variables, basic partial differential equations, and linear algebra, as the necessary concepts from more advanced analysis are introduced when needed. Throughout the text we emphasize implementation of the involved algorithms, and have therefore mixed mathematical theory with concrete computer code using the numerical software MATLAB is and its PDE-Toolbox. We have also had the ambition to cover some of the most important applications of finite elements and the basic finite element methods developed for those applications, including diffusion and transport phenomena, solid and fluid mechanics, and also electromagnetics. .