1. Record Nr. UNINA9910877551403321 Autore Lui S. H (Shaun H.), <1961-> Titolo Numerical analysis of partial differential equations / / S.H. Lui Pubbl/distr/stampa Hoboken, N.J., : Wiley, c2011 **ISBN** 1-283-28277-1 9786613282774 1-118-11111-7 1-118-11113-3 1-118-11110-9 Descrizione fisica 1 online resource (508 p.) Collana Pure and applied mathematics: a Wiley series of texts, monographs, and tracts Classificazione MAT034000 Disciplina 518.64 518/.64 Differential equations, Partial - Numerical solutions Soggetti Variational inequalities (Mathematics) 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. Numerical Analysis of Partial Differential Equations; Contents; Preface; Nota di contenuto Acknowledgments; 1 Finite Difference; 1.1 Second-Order Approximation for ; 1.2 Fourth-Order Approximation for ; 1.3 Neumann Boundary Condition; 1.4 Polar Coordinates; 1.5 Curved Boundary; 1.6 Difference Approximation for 2; 1.7 A Convection-Diffusion Equation; 1.8 Appendix: Analysis of Discrete Operators; 1.9 Summary and Exercises; 2 Mathematical Theory of Elliptic PDEs; 2.1 Function Spaces; 2.2 Derivatives; 2.3 Sobolev Spaces; 2.4 Sobolev Embedding Theory; 2.5 Traces; 2.6 Negative Sobolev Spaces 2.7 Some Inequalities and Identities 2.8 Weak Solutions; 2.9 Linear Elliptic PDEs; 2.10 Appendix: Some Definitions and Theorems; 2.11 Summary and Exercises: 3 Finite Elements: 3.1 Approximate Methods of Solution; 3.2 Finite Elements in 1D; 3.3 Finite Elements in 2D; 3.4 Inverse Estimate; 3.5 L2 and Negative-Norm Estimates; 3.6 Higher-Order Elements; 3.7 A Posteriori Estimate; 3.8 Quadrilateral Elements; 3.9 Numerical Integration; 3.10 Stokes Problem; 3.11 Linear Elasticity;

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## Sommario/riassunto

A balanced guide to the essential techniques for solving elliptic partial differential equations Numerical Analysis of Partial Differential Equations provides a comprehensive, self-contained treatment of the quantitative methods used to solve elliptic partial differential equations (PDEs), with a focus on the efficiency as well as the error of the presented methods. The author utilizes coverage of theoretical PDEs, along with the nu merical solution of linear systems and various examples and exercises, to supply readers with an introduction to the essential concepts in the num