

1. Record Nr.	UNINA9910299783903321
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Titolo	Numerical methods for nonlinear partial differential equations / / by Sören Bartels
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2015
ISBN	3-319-13797-2
Edizione	[1st ed. 2015.]
Descrizione fisica	1 online resource (394 p.)
Collana	Springer Series in Computational Mathematics, , 0179-3632 ; ; 47
Disciplina	510 515.353 515.64 518 518.1
Soggetti	Numerical analysis Differential equations, Partial Algorithms Calculus of variations Numerical Analysis Partial Differential Equations Calculus of Variations and Optimal Control; Optimization
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 at the end of each chapters and index.
Nota di contenuto	1. Introduction -- Part I: Analytical and Numerical Foundations -- 2. Analytical Background -- 3. FEM for Linear Problems -- 4. Concepts for Discretized Problems -- Part II: Approximation of Classical Formulations -- 5. The Obstacle Problem -- 6. The Allen-Cahn Equation -- 7. Harmonic Maps -- 8. Bending Problems -- Part III: Methods for Extended Formulations -- 9. Nonconvexity and Microstructure -- 10. Free Discontinuities -- 11. Elastoplasticity -- Auxiliary Routines -- Frequently Used Notation -- Index.
Sommario/riassunto	The description of many interesting phenomena in science and engineering leads to infinite-dimensional minimization or evolution problems that define nonlinear partial differential equations. While the

development and analysis of numerical methods for linear partial differential equations is nearly complete, only few results are available in the case of nonlinear equations. This monograph devises numerical methods for nonlinear model problems arising in the mathematical description of phase transitions, large bending problems, image processing, and inelastic material behavior. For each of these problems the underlying mathematical model is discussed, the essential analytical properties are explained, and the proposed numerical method is rigorously analyzed. The practicality of the algorithms is illustrated by means of short implementations.

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