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Nonlinear Computational Structural Mechanics: New ...

Nonlinear Computational Structural Mechanics Book Subtitle New Approaches and Non-Incremental Methods of Calculation Authors. Pierre Ladeveze; Translated by Simmonds, J.G. Series Title Mechanical Engineering Series Copyright 1999 Publisher Springer-Verlag New York Copyright Holder Springer Science+Business Media New York eBook ISBN 978-1-4612-1432-8 DOI

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Nonlinear Computational Structural Mechanics: New Approaches and Non-Incremental Methods of Calculation Pierre Ladevèze (auth.) Mechanical Engineering, an engineering discipline borne of the needs of the in dustrial revolution, is once again asked to do its substantial share in the call for industrial renewal.

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The convergence characteristics of three geometrically accurate spatial finite elements (FEs) are examined in this study using an eigenvalue analysis. The spatial beam, plate, and

Convergence Characteristics of Geometrically Accurate ...

Nonlinear computational structural mechanics : new approaches and non-incremental methods of calculation. [Pierre Ladevèze] -- This book treats computational modeling of structures in which strong nonlinearities are present.

Nonlinear computational structural mechanics : new ...

The Computational Structural Mechanics (CSM) group undertakes internationally leading research that i) extends the frontiers of computational mechanics at the conceptual and applied levels, ii) underpins cutting edge applied research in structural engineering, and iii) provides novel modelling solutions for engineering practice. The group is led by Professor Bassam Izzuddin, who has fostered a collaborative ethos with colleagues at Imperial College and cooperated with leading researchers at ...

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This book presents the fundamentals of nonlinear mechanics within a modern computational approach based mainly on finite element methods. Both material and geometric nonlinearities are treated. The topics build up from the mechanics of finite deformation of solid bodies through to nonlinear structural behaviour including buckling, bifurcation and snap-through.

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Computational Methods in Nonlinear Structural and Solid ...

Nonlinear Structural Mechanics: Theory, Dynamical Phenomena and Modeling offers a concise, coherent presentation of the theoretical framework of nonlinear structural mechanics, computational methods, applications, parametric investigations of nonlinear phenomena and their mechanical interpretation towards design. The theoretical and computational tools that enable the formulation, solution, and interpretation of nonlinear structures are presented in a systematic fashion so as to gradually ...

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The FE algorithm based on two-scale analysis method for the structural problems of composite materials and the structures with small period in 2-dimension case is briefly presented in this paper, and some numerical results are shown. It is an effective method in computational mechanics to be developing.

Computational Mechanics in Structural Engineering ...

This book presents the fundamentals of nonlinear mechanics within a modern computational approach based mainly on finite element methods. Both material

This book treats computational modeling of structures in which strong nonlinearities are present. It is therefore a work in mechanics and engineering, although the discussion centers on methods that are considered parts of applied mathematics. The task is to simulate numerically the behavior of a structure under various imposed excitations, forces, and displacements, and then to determine the resulting damage to the structure, and ultimately to optimize it so as to minimize the damage, subject to various constraints. The method used is iterative: at each stage an approximation to the displacements, strains, and stresses throughout the structure is computed and over all times in the interval of interest. This method leads to a general approach for understanding structural models and the necessary approximations.

This book reviews the theoretical framework of nonlinear mechanics, covering computational methods, applications, parametric investigations of nonlinear phenomena and mechanical interpretation towards design. Builds skills via increasing levels of complexity.

This course with 6 lecturers intends to present a systematic survey of recent re search results of well-known scientists on error-controlled adaptive finite element methods in solid and structural mechanics with emphasis to problem-dependent concepts for adaptivity, error analysis as well as h- and p-adaptive refinement techniques including meshing and remeshing. Challenging applications are of equal importance, including elastic and elastoplastic deformations of solids, con tact problems and thin-walled structures. Some major topics should be pointed out, namely: (i) The growing importance of goal-oriented and local error estimates for quan tities of interest—in comparison with global error estimates—based on dual finite element solutions; (a) The importance of the p-version of the finite element method in conjunction with parameter-dependent hierarchical approximations of the mathematical model, for example in boundary layers of elastic plates; (Hi) The choice of problem-oriented error measures in suitable norms, consider ing residual, averaging and hierarchical error estimates in conjunction with the efficiency of the associated adaptive computations; (iv) The importance of implicit local postprocessing with enhanced test spaces in order to get constant-free, i. e. absolute-not only relative-discretizati- error estimates; (v) The coupling of error-controlled adaptive discretizations and the mathemat ical modeling in related subdomains, such as boundary layers. The main goals of adaptivity are reliability and efficiency, combined with in sight and access to controls which are independent of the applied discretization methods. By these efforts, new paradigms in Computational Mechanics should be realized, namely verifications and even validations of engineering models.

This book presents the fundamentals of nonlinear mechanics within a modern computational approach based mainly on finite element methods. Both material and geometric nonlinearities are treated. The topics build up from the mechanics of finite deformation of solid bodies through to nonlinear structural behaviour including buckling, bifurcation and snap-through. The principles are illustrated with a series of solved problems. This book serves as a text book for a second year graduate course and as a reference for practitioners using nonlinear analysis in engineering and design.

The EURO-C conference series (Split 1984, Zell am See 1990, Innsbruck 1994, Badgastein 1998, St Johann im Pongau 2003, Mayrhofen 2006, Schladming 2010, St Anton am Alberg 2014) brings together researchers and practising engineers concerned with theoretical, algorithmic and validation aspects associated with computational simulations of concrete and concrete structures. The conference reviews and discusses research advancements and the applicability and robustness of methods and models for reliable analysis of complex concrete, reinforced concrete and pre-stressed concrete structures in engineering practice. Conference topics and invited papers cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures: * Constitutive and Multiscale Modelling of Concrete * Advances in Computational Modelling * Time Dependent and Multiphysics Problems * Performance of Concrete Structures The book is of special interest to researchers in computational concrete mechanics, as well as industry experts in complex nonlinear simulations of concrete structures.

III European Conference on Computational Mechanics: Solids, Structures and Coupled Problem in Engineering Computational Mechanics in Solid, Structures and Coupled Problems in Engineering is today a mature science with applications to major industrial projects. This book contains the edited version of the Abstracts of Plenary and Keynote Lectures and Papers, and a companion CD-ROM with the full-length papers, presented at the III European Conference on Computational Mechanics: Solids, Structures and Coupled Problems in Engineering (ECCM-2006), held in the National Laboratory of Civil Engineering, Lisbon, Portugal 5th - 8th June 2006. The book reflects the state-of-art of Computation Mechanics in Solids, Structures and Coupled Problems in Engineering and it includes contributions by the world most active researchers in this field.

The EURO-C conference series (Split 1984, Zell am See 1990, Innsbruck 1994, Badgastein 1998, St. Johann im Pongau 2003, Mayrhofen 2006, Schladming 2010, St. Anton am Arlberg 2014, and Bad Hofgastein 2018) brings together researchers and practising engineers concerned with theoretical, algorithmic and validation aspects associated with computational simulations of concrete and concrete structures. Computational Modelling of Concrete Structures reviews and discusses research advancements and the applicability and robustness of methods and models for reliable analysis of complex concrete, reinforced concrete and pre-stressed concrete structures in engineering practice. The contributions cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures: Multi-scale cement and concrete research: experiments and modelling Aging concrete: from very early ages to decades-long durability Advances in material modelling of plain concrete Analysis of reinforced concrete structures Steel-concrete interaction, fibre-reinforced concrete, and masonry Dynamic behaviour: from seismic retrofit to impact simulation Computational Modelling of Concrete Structures is of special interest to academics and researchers in computational concrete mechanics, as well as industry experts in complex nonlinear simulations of concrete structures.

Mechanical engineering, an engineering discipline born of the needs of the Industrial Revolution, is once again asked to do its substantial share in the call for industrial renewal. The general call is urgent as we face the profound issues of productivity and competitiveness that require engineering solutions, among others. The Mechanical Engineering Series is a new series, featuring graduate texts and research monographs, intended to address the need for information in contemporary areas of mechanical engineering. The series is conceived as a comprehensive one that will cover a broad range of concentrations important to mechanical engineering graduate education and research. We are fortunate to have a distinguished roster of consulting editors, each an expert in one of the areas of concentration. The names of the consult ing editors are listed on page vi. The areas of concentration are applied mechanics, biomechanics, computational mechanics, dynamic systems and control, energetics, mechanics of materials, processing, thermal science, and tribology. We are pleased to present Nonlinear Analysis of Thin-Walled Structures by James F. Doyle. Austin, Texas Frederick F. Ling Preface This book is concerned with the challenging subject of the nonlinear static, dynamic, and stability analyses of thin-walled structures. It carries on from where Static and Dynamic Analysis of Structures, published by Kluwer 1991, left off; that book concentrated on frames and linear analysis, while the present book is focused on plated structures, nonlinear analysis, and a greater emphasis on stability analysis.

This book deals with the management of calculations in linear and nonlinear mechanics. Particular attention is given to error estimators and indicators for structural analysis. The accent is on the concept of error in constitutive relation. An important part of the work is also devoted to the utilization of the error estimators involved in a calculation, beginning with the parameters related to the mesh. Many of the topics are taken from the most recent research by the authors: local error estimators, extention of the concept of error in constitutive relation to nonlinear evolution problems and dynamic problems, adaptive improvement of calculations in nonlinear mechanics. This work is intended for all those interested in mechanics: students, researchers and engineers concerned with the construction of models as well as their simulation for industrial purposes.

This book provides a comprehensive introduction to the mathematical and algorithmic methods for the Multidisciplinary Design Optimization (MDO) of complex mechanical systems such as aircraft or car engines. We have focused on the presentation of strategies efficiently and economically managing the different levels of complexity in coupled disciplines (e.g. structure, fluid, thermal, acoustics, etc.), ranging from Reduced Order Models (ROM) to full-scale Finite

Element (FE) or Finite Volume (FV) simulations. Particular focus is given to the uncertainty quantification and its impact on the robustness of the optimal designs. A large collection of examples from academia, software editing and industry should also help the reader to develop a practical insight on MDO methods.