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Autore	Reddy J. N (Junuthula Narasimha), <1945->
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Differential Equation; 3.2 Weak Formulation; 3.3 Finite Element Model; 3.4 Solution Procedures; 3.4.1 General Comments; 3.4.2 Direct Iteration Procedure; 3.4.3 Newton's Iteration Procedure; 3.5 Computer Implementation; 3.5.1 Introduction; 3.5.2 Preprocessor Unit; 3.5.3 Processor Unit; 3.6 Closing Remarks; Problems; References; 4 Nonlinear Bending of Straight Beams; 4.1 Introduction; 4.2 Euler-Bernoulli Beams; 4.2.1 Basic Assumptions; 4.2.2 Displacement Field and Strains; 4.2.3 Weak Forms; 4.2.4 Finite Element Model
4.2.5 Iterative Solutions of Nonlinear Equations4.2.6 Load Increments; 4.2.7 Membrane Locking; 4.2.8 Computer Implementation; 4.3 Timoshenko Beams; 4.3.1 Displacement Field and Strains; 4.3.2 Weak Forms; 4.3.3 General Finite Element Model; 4.3.4 Shear and Membrane Locking; 4.3.5 Tangent Stiffness Matrix; Problems; References; 5 Heat Transfer and Other Fields Problems in Two Dimensions; 5.1 Model Equation; 5.2 Weak Form; 5.3 Finite Element Model; 5.4 Solution Procedures; 5.4.1 Direct Iteration; 5.4.2 Newton-Raphson Iteration; 5.5 Computer Implementation; 5.5.1 Introduction
5.5.2 Numerical Integration5.5.3 Element Calculations; Problems; References; 6 Nonlinear Bending of Elastic Plates; 6.1 Introduction; 6.2 Classical Plate Theory; 6.2.1 Assumptions of the Kinematics; 6.2.2 Displacement Field and Strains; 6.3 Variational Formulation of CPT; 6.3.1 Virtual Work; 6.3.2 Weak Forms; 6.3.3 Equilibrium Equations; 6.3.4 Boundary Conditions; 6.3.5 Stress Resultant-Deflection Relations; 6.4 Finite Element Models of CPT; 6.4.1 General Formulation; 6.4.2 Tangent Stiffness Coefficients; 6.4.3 Some Plate Finite Elements
6.5 Computer Implementation Aspects and Numerical Results of CPT Elements

Sommario/riassunto

This book presents the theory and computer implementation of the finite element method as applied to nonlinear problems of heat transfer and similar field problems, fluid mechanics (flows of incompressible fluids), and solid mechanics (elasticity, beams and plates). Both geometric as well as material nonlinearities are considered, and static and transient (i.e. time-dependent) responses are studied. Although there exist a number of books on nonlinear finite elements that serve asgood references for engineers who are familiar with the subject and wish to learn advanced topics or the latest deve

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Sommario/riassunto	Rheology is an integral part of life, from decorative paint and movement of volcanic lava to the flow of blood in our veins. This book describes, without the use of complex mathematics, how atoms and molecules interact to control the handling properties of materials ranging from simple ionic crystals through polymers to colloidal dispersions.Beginning with an introduction to essential terminology, Rheology for Chemists goes on to discuss limiting behaviour, temporal behaviour and non-linear behaviour. Throughout, examples of everyday experiments are provided to illustrate the theory, which inc