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Element3.7 Shear Projection Method - Bathe-Dvorkin (B-D) Element3.8 Assessment of Four-Node R-M Plate Element4 Three-Node Shell Element (Reissner-Mindlin Plate Theory)4.1 Fundamentals of a Three-Node C0 Element4.2 Decomposition Method for C0 Triangular Element with One Point Integration4.3 Discrete Kirchhoff Triangular (DKT) Element4.4 Assessment of Three-Node R-M Plate Element5 Eight-Node Solid Element5.1 Trilinear Interpolation for the Eight-Node Hexahedron Element5.2 Locking Issues of the Eight-Node Solid Element5.3 One-Point Reduced Integration and the Perturbed Hourglass Control5.4 Assumed Strain Method and Selective / Reduced Integration5.5 Assumed Deviatoric Strain5.6 An Enhanced Assumed Strain Method5.7 Taylor Expansion of Assumed Strain about the Element Center5.8 Evaluation of Eight-Node Solid Element6 Two-Node Element6.1 Truss and Rod Element6.2 Timoshenko Beam Element6.3 Spring Element6.4 Spot Weld ElementPART 3 Material Models7 Material Model of Plasticity7.1 Fundamentals of Plasticity7.2 Constitutive Equations7.3 Software Implementation7.4 Evaluation of Shell Elements with Plastic Deformation8 Continuum Mechanics Model of Ductile Damage8.1 Concept of Damage Mechanics8.2 Gurson's Model8.3 Chow's Isotropic Model of Continuum Damage Mechanics8.4 Chow's Anisotropic Model of Continuum Damage Mechanics9 Models of Nonlinear Materials9.1 Vicoelasticity9.2 Polymer and Engineering Plastics9.3 Rubber9.4 Foam9.5 Honeycomb9.6 Laminated GlazingPART 4 Contact and Constraint Conditions10 Three-Dimensional Surface Contact10.1 Examples of Contact Problems10.2 Description of Contact Conditions10.3 Variational Principle for the Dynamic Contact Problem10.4 Penalty Method and the Regularization of Variational Inequality11 Numerical Procedures for Three-Dimensional Surface Contact11.1 A Contact Algorithm with Slave Node Searching Master Segment11.2 A Contact Algorithm with Master Segment Searching Slave Node11.3 Method of Contact Territory and Defense Node11.4 Pin- Ball Contact Algorithm11.5 Edge (Line Segment) Contact11.6 Evaluation of Contact Algorithm with Penalty Method12 Kinematic Constraint Conditions12.1 Rigid Wall12.2 Rigid Body12.3 Explicit Finite Element Procedure with Constraint Conditions12.4 Application Examples with Constraint Conditions.

Sommario/riassunto

"This is the first book to specifically address the explicit finite element method for nonlinear transient dynamics. This book aids readers in mastering the explicit finite element method as well as programming a code without extensively reading the more general finite element books. This book consists of 12 chapters within four sections including: the variation principles and formulation of the explicit finite element method for nonlinear transient dynamics; the finite element technology with 4-node and 3-node Reissner-Mindlin plate bending elements, the 8-node solid elements, etc.; plasticity and nonlinear material models; and contact algorithms and other kinematic constraint conditions. Each chapter contains a list of carefully chosen references intended to help readers to further explore the related subjects"--