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Numerical investigation of large elastoplastic strains of three-dimensional bodies

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Abstract

A method of stress-strain analysis of elastoplastic bodies with large displacements, rotations, and finite strains is developed. The incremental loading technique is used within the framework of the arbitrary Lagrangian-Eulerian formulation. Constitutive equations are derived which relate the Jaumann derivative of the Cauchy-Euler stress tensor and the strain rate. The spatial discretization is based on the FEM and multilinear three-dimensional isoparametric approximation. An algorithm of stress-strain analysis of elastic, hyperelastic, and perfectly plastic bodies is given. Numerical examples demonstrate the capabilities of the method and its software implementation. ©2005 Springer Science+Business Media, Inc.

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Keywords

FEM, Incremental loading technique, Large elastoplastic strains, Stress-strain state, Three-dimensional body