

Elastic-Plastic Large Deformation Analysis of 2D Frame Structure

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This paper presents a numerical simulation method, so called vector form intrinsic finite element (VFIFE) method that can conduct the analysis of 2D frame structure under elastic-plastic large deformation. This new method can simultaneously calculate large rigid body motions and large geometrical changes of a structural system consisting of multiple continuous bodies. The essence of the method includes a set of equations of motion for the modeling nodes of the system, an explicit time integration scheme, the use of a deformation coordinate system to dissect rigid body and deformation displacements, and the use of a convected material reference frame to handle the deformation. Numerical examples of frame structure having large elastic-plastic deformation states under static and dynamic excitations are demonstrated to verify the accuracy and effectiveness of this newly proposed method.

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