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Large-deformation triangular and tetrahedral element formulations for unstructured meshes. (English) Zbl 0980.74056

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Summary: A mixed formulation is proposed to treat the volumetric locking and element distortions, and is applied to triangular and tetrahedral elements. The formulation enforces, in weak sense, the expression for the volumetric strain in terms of deformation gradient. The mixed formulation is combined with an irreducible formulation to provide a balance between the treatment of volumetric locking and the maintenance of an adequate critical timestep. Three techniques are proposed to determine such a balance at the local (element) level. Example computations in two and three dimensions for an iron cylinder impacting a rigid surface are used to demonstrate the formulations, and to compare them to the irreducible displacement-based formulation.

MSC:

74S05 Finite element methods applied to problems in solid mechanics

Cited in **3** Documents

74C15 Large-strain, rate-independent theories of plasticity (including nonlinear plasticity)

Keywords:

unstructured meshes; triangular element; mixed formulation; volumetric locking; element distortion; tetrahedral elements; volumetric strain; deformation gradient; irreducible formulation; critical timestep

Software:

EPIC; Nike2D

Full Text: [DOI](#)

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