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A two-dimensional co-rotational Timoshenko beam element with XFEM formulation. (English) [Zbl 1398.74423](#)
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Summary: Pin connections and plastic hinges produce non-smooth displacement fields in beam structures. By using an appropriate extended finite element method (XFEM), non-smooth solutions can be obtained by regular coarse meshes, which do not necessarily conform to pins or plastic hinges. In this paper, a two-dimensional co-rotational beam element with XFEM formulation to simulate pin connections and plastic hinges is presented. Enrichments for the rotation and the deflection approximations are embedded in a co-rotational frame to capture the non-smoothness in both small and large deformations. Numerical examples on pin connections and plastic hinges demonstrate the accuracy and robustness of the present formulation.

MSC:

74S05 Finite element methods applied to problems in solid mechanics
74R10 Brittle fracture
74K10 Rods (beams, columns, shafts, arches, rings, etc.)
74B20 Nonlinear elasticity
74B05 Classical linear elasticity

Cited in 4 Documents

Keywords:

extended finite element method; co-rotational formulation; shifted enrichment; Timoshenko beam; perfect pin; plastic hinge

Full Text: [DOI](#)

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