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A finite element method for crack growth without remeshing. (English) Zbl 0955.74066

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Summary: We present an improvement of a new technique for modelling cracks in the finite element framework. A standard displacement-based approximation is enriched near a crack by incorporating both discontinuous fields and the near-tip asymptotic fields through a partition-of-unity method. We develop a methodology that constructs the enriched approximation from the interaction of the crack geometry with the mesh. This technique allows the entire crack to be represented independently of the mesh, and so remeshing is not necessary to model crack growth. Numerical experiments demonstrate the utility of the proposed technique.

MSC:

74S05 Finite element methods applied to problems in solid mechanics
74R10 Brittle fracture

Keywords:

finite elements; fracture; displacement-based approximation; discontinuous fields; near-tip asymptotic fields; partition-of-unity method; crack geometry; crack growth

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