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A three-dimensional meshfree method for continuous multiple-crack initiation, propagation and junction in statics and dynamics. (English) [Zbl 1161.74054](#)

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Summary: This paper proposes a three-dimensional meshfree method for arbitrary crack initiation and propagation that ensures crack path continuity for nonlinear material models and cohesive laws. The method is based on a local partition of unity. An extrinsic enrichment of the meshfree shape functions is used with discontinuous and near-front branch functions to close the crack front and improve accuracy. The crack is hereby modeled as a jump in the displacement field. The initiation and propagation of a crack is determined by the loss of hyperbolicity or the loss of material stability criterion. The method is applied to several static, quasi-static and dynamic crack problems. The numerical results very precisely replicate available experimental and analytical results.

MSC:

74S30 Other numerical methods in solid mechanics (MSC2010)

74R20 Anelastic fracture and damage

74R10 Brittle fracture

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Keywords:

extended element-free Galerkin method; partition of unity enrichment; material stability criterion

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