Remmers, J. J. C.; **de Borst, R.**; **Needleman, A.**

A cohesive segments method for the simulation of crack growth. (English) Zbl 1038.74679

Comput. Mech. 31, No. 1-2, 69-77 (2003).

Summary: A numerical method for crack growth is described in which the crack is not regarded as a single discontinuity that propagates continuously. Instead, the crack is represented by a set of overlapping cohesive segments. These cohesive segments are inserted into finite elements as discontinuities in the displacement field by exploiting the partition-of-unity property of shape functions. The cohesive segments can be incorporated at arbitrary locations and orientations and are not tied to any particular mesh direction. The evolution of decohesion of the segments is governed by a cohesive law. The independent specification of bulk and cohesive constitutive relations leads to a characteristic length being introduced into the formulation. The formulation permits both crack nucleation and discontinuous crack growth to be modelled. The implementation is outlined and some numerical examples are presented.

MSC:

74S30 Other numerical methods in solid mechanics (MSC2010)
74R10 Brittle fracture

Keywords:

Crack growth; Fracture; Cohesive zones; Partitions of unity

Full Text: DOI