SM1L_11211

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

A New Approach for the FE Modelling of Cohesive Cracks

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The present contribution is concerned with the computational modelling of cohesive cracks in quasi-brittle materials, whereby the discontinuity is not limited to interelement boundaries, but is allowed to propagate freely through the elements. In the elements, which are intersected by the discontinuity, additional displacement degrees of freedom are introduced at the existing nodes. Therefore two independent copies of the standard basis functions are used. One set is put to zero on one side of the discontinuity, while it takes its usual values on the opposite side, and vice versa for the other set. To model inelastic material behaviour, a discrete damage-type constitutive model is applied, formulated in terms of displacements and tractions at the surface. Some details on the numerical implementation are given, concerning the failure criterion, the determination of the direction of the discontinuity and the integration scheme. Finally numerical examples show the performance of the method.

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