Dias-da-Costa, D.; **Alfaiate, J.**; **Sluys, L. J.**; **Júlio, E.**

A comparative study on the modelling of discontinuous fracture by means of enriched nodal and element techniques and interface elements. (English) Zbl 1273.74531

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From the summary: In this paper, three different approaches used to model strong discontinuities are studied: a new strong embedded discontinuity technique, designated as the discrete strong embedded discontinuity approach ($DSDA$), the generalized finite element method ($GFEM$) and the use of interface elements. First, it is shown that all three descriptions are based on the same variational formulation. However, the main differences between these models lie in the way the discontinuity is represented in the finite element mesh, which is explained in the paper. Main focus is on the differences between the element enrichment technique, used in the $DSDA$ and the nodal enrichment technique adopted in the $GFEM$. In both cases, global enhanced degrees of freedom are adopted. Next, the numerical integration of the discretised equations in the three methods is addressed and some important differences are discussed. Two types of numerical tests are presented: first, simple academic examples are used to emphasize the differences found in the formulations and next, some benchmark tests are computed.

MSC:

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

Keywords:

strong embedded discontinuity; discrete crack approach; generalized finite element method

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