عنوان مقاله:

Evaluation of Fracture Parameters by Coupling the Edge-Based Smoothed Finite Element Method and the Scaled Boundary Finite Element Method

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خلاصه مقاله:

This paper presents a technique to evaluate the fracture parameters by combining the edge based smoothed finite element method (ESFEM) and the scaled boundary finite element method (SBFEM). A semi-analytical solution is sought in the region close to the vicinity of the crack tip using the SBFEM, whilst, the ESFEM is used for the rest of the domain. As both methods satisfy the partition of unity and the compatibility condition, the stiffness matrices obtained from both methods can be assembled as in the conventional finite element method. The stress intensity factors (SIFs) are computed directly from their definition. Numerical examples of linear elastic bodies with cracks are solved without requiring additional post-processing techniques. The SIFs computed using the proposed technique are in a good agreement with the reference solutions. A crack propagation study is also carried out with minimal local remeshing to show the robustness of the proposed technique. The maximum circumferential stress criterion is used to predict the direction of propagation.

کلمات کلیدی:

Stress intensity factor, singularity, edge based smoothed finite element method, scaled boundary finite element method