

A Non-matching SBFEM-FEM Coupled method for Linear Elastic Fracture Modelling

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ABSTRACT

This paper develops a novel method coupling the scaled boundary finite element method (SBFEM) and the finite element method (FEM) for linear elastic fracture modelling. A very simple but effective remeshing procedure based on the finite element mesh only is used to accommodate crack propagation. The crack-tip mesh is replaced by an SBFE subdomain whose semi-analytical displacement solutions are used to extract accurate stress intensity factors. The difference between the present method and a previous SBFE-FEM hybrid method (Ooi and Yang, *Computer Methods in Applied Mechanics and Engineering* 2010, Vol. 199, No. 17-20, 1178-1192) is that in the present method, the SBFE subdomain boundary is coupled with the surrounding FE mesh boundary through a virtual structural surface so that the nodal discretisations of the two boundaries can be different (i.e., non-matching) and only one SBFE subdomain is needed, whereas in the latter, several subdomains are needed to maintain the matching nodal discretisation. A few plane problems are modelled to validate the new method.

KEYWORDS: scaled boundary finite element method, non-matching mesh, stress intensity factors, crack propagation, remeshing procedure, linear elastic fracture mechanics.

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