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Modelling of Crack Propagation without Enrichment

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We present the development of the scaled boundary polygons and the application to crack propagation problems. A polygon may have any number of sides as long as a point from where the whole boundary is visible can be identified. Only the boundary of the polygon is discretised. The solution for the displacements and stresses inside the polygon is obtained analytically leading to accurate results. This technique has the following attractive features: (1) No asymptotic enrichment, local refinement or other special technique is needed to model strain/stress singularities. (2) All types of singularity, as occurring in bimaterial interface and multi-material corners, are handled robustly in a unified expression. (3) The arbitrary *n*-side polygons offer great flexibility in mesh generation, local remeshing and mesh density transition to model crack propagation and other moving boundary problems. (4) No special integration techniques are required in computing the stiffness matrix.

Keywords: Scaled boundary polygon, crack propagation, fracture analysis, enrichment