

## A PARTITION OF UNITY BASED INTEGRATION FOR ENERGY INTEGRAL OF 3D NON PLANAR CRACKS

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In fracture modelling, the stress field near the crack tip is dominated by stress concentration where cohesive crack is adopted, or is dominated by stress singularity where the linear elastics are assumed. In both cases, high energy release rate occurs near the crack tip in 2D, or as crack front in 3D, making the accurate calculation of energy integral such as stress intensity factors (SIF) as the indicators of fracture parameters a challenging task, especially in 3D modelling where crack front is curved and the tangential curvature needs to be taken into account. To solve this problem, we present an enriched integration scheme based on the partition of unity to improve the results accuracy of SIF. By using the partition of unity as the weight coefficients for the integration points, the weak form integration is performed without the need of background mesh and the integration patches are used which are associated with nodes. The refinement of integration points that are needed near the crack front is performed based on the local curvilinear coordinates and the tangential curvature along the crack front is taken into account. Test examples are presented showing the effectiveness of the present method in calculating SIF and the improved better accuracy compared with Gauss integration scheme.

**Keywords:** meshless methods, 3D fracture modelling, non-planar crack, partition of unity, stress intensity factor, crack propagation.