

Development of a Novel 'Crack' Finite Element for Propagation Simulation

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In this paper, we propose a 2D 'crack' element for the simulation of propagating crack with minimal remeshing. A regular finite element containing the crack tip is replaced with this novel crack element, while the elements which the crack has passed are split into two transition elements. Singular elements can easily be implemented into this crack element to represent the crack-tip singularity without enrichment. Both crack element and transition element proposed in our formulation are mapped from corresponding master elements which are commonly built using the moving least-square (MLS) approximation only in the natural coordinate. In numerical examples, the accuracy of stress intensity factor K_I is demonstrated and the crack propagation in a plate is simulated.

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