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FEM Techniques Comparison for SIF Computing of Cracked Plate

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Abstract: The main purpose of this paper is to perform a computation comparison of stress intensity factor ‘SIF’ evaluation in case of cracked thin plate with aluminum alloy 7075-T6 and 2024-T3 used in aeronautics structure under uniaxial loading. This evaluation is based on finite element method with a virtual power principle through two techniques: the extrapolation and G?? . The first one consists to extrapolate the nodal displacements near the cracked tip using a refined triangular mesh with T3 and T6 special elements, while the second, consists to determine the energy release rate G through G?? method by potential energy derivation which corresponds numricaly to elastic solution post-processing of a cracked solid by a contour integration computation via Gauss points. The SIF obtained results from extrapolation and G?? methods will be compared to analytical solution in particular case. To illustrate the influence of the meshing kind and the size of integration contour position, simulations are presented and analyzed.

Keywords : stress intensity, energy release rate G