

# 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  $G_{II}$ . 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  $G_{II}$  method by potential energy derivation which corresponds numerically to elastic solution post-processing of a cracked solid by a contour integration computation via Gauss points. The SIF obtained results from extrapolation and  $G_{II}$  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  $G$