# Mode III stress intensity factors of surface crack in round bars

## Abstract

This study presents a numerical investigation on the stress intensity factors (SIF), K of surface cracks in round bars that were obtained under pure torsion loadings or mode III. ANSYS finite element analysis (FEA) was used to determine the SIFs along the crack front of surface cracks embedded in the solid circular bars. 20-node isoparametric singular elements were used around the crack tip by shifting the mid-side node 1/4-position close to a crack tip. Different crack aspect ratio, a/b were used ranging between 0.0 to 1.2 and relative crack depth, a/D were ranged between 0.1 to 0.6. Mode I SIF, K I obtained under bending moment was used to validate the proposed model and it was assumed this proposed model validated for analyzing mode III problems. It was found that, the mode II SIF, FII and mode III SIF, FIII were dependent on the crack geometries and the sites of crack growth were also dependent on a/b and a/D.