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ABSTRACT

The influence of the three-dimensional effects of the distribution of the stress intensity factor in the numerical calculation of plasticity-induced crack closure is analysed in this paper. The usual methodology assumes a constant distribution of K along the thickness to obtain the effective stress intensity factor of the crack. This assumption should not be transposed to models that intend to observe phenomena in the crack front vicinity, where 3-D effects are a key aspect in the results. Through numerical simulations of both fracture and fatigue of through thickness straight cracks (CT specimen in mode I), the local opening and closure moment of each crack node is obtained and compared with previous one. Corrections are proposed for numerical methodology to obtain K_{op} and K_{cl} distribution along the thickness.

KEYWORDS

Finite element analysis, fatigue, PICC, stress intensity factor

ABBREVIATIONS

a	Crack length
b	Specimen's thickness
CT	Compact Tension specimen
E	Young's modulus
FE	Finite element analysis
K	Stress intensity factor
K_{cod}	Stress intensity factor due to COD method
K_J	Stress intensity factor due to J-integral method
K_{max}	Maximum stress intensity factor
K_{min}	Minimum stress intensity factor
K_N	Nominal stress intensity factor