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A FINITE ELEMENT APPROACH TO DETERMINE STRESS INTENSITY CORRECTION FACTOR BY CRACK TIP OPENING DISPLACEMENT METHOD AND J-INTEGRAL METHOD

P. V. JOSHI AND AJAY TIWARI

Abstract

Most of the failure occurring in the engineering field can be attributed to crack related problems. A FEM based approach can be more useful to analyze the three modes of failure. Out of three modes of failure, i .e. opening mode or mode-1, sliding mode or mode -2 & tearing mode or mode-3, This paper finds the stress intensity correction factor (SICF) for the mode-1 using crack tip opening displacement method (CTOD) method and J- Integral method. A rectangular plate having a hair sized crack is analyzed for stress intensity correction factor (SICF), Also stress intensity factor is calculated for improving the engineering design approximation. The rectangular plate having hair crack of length 2a is analyzed by FE modeling. The values of SICF obtained are compared with values given by ISIDA. It is observed that at low h./b values the SICF is higher and consistently decreases as h/b increases. The results show a good resemblance with the reference data given by ISIDA. It can be seen that the error is limited to the order of 10^{-1} which can be further improved.

Keywords: SCF Stress Correction Factor, SIF Stress Intensity Factor, LEFM Linear Elastic Fracture Mechanics FEM Finite Element Method, CTOD Crack Tip Opening Displacement