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Preliminary study of using kerf as an alternative to crack interactions in multiple edge cracks based on non-uniform stress distribution

Abstract

Multiple cracks with different or similar geometries that coexist on the same plane will affect its neighbouring counterpart's Stress Intensity Factor (SIF) value due to interaction effect. The interaction effect is much related to the change of stress distribution profile that produced by neighbouring crack. This study attempts to simulate and find a possibility to replace subsequent crack interaction to primary crack with kerf by evaluating the longitudinal stress distribution component. For this paper, the scope focuses on emulating two parallel edge cracks' interaction as initial attempt. Through simulation on ABAQUS Computer Aided Engineering (CAE), values of non-uniform stress distributions that produced by kerf within the potential primary crack region was analyzed and compared to non-uniform stress distributions that produced by a crack as validation. Absolute error tabulation of stress distribution that produced by kerf suggests that it is fit to replace subsequent crack for further study of interaction in multiple cracks.

Keywords; Non-Uniform Stress Distribution; Kerf; Interaction Effect