

Accepted Manuscript

Stress Intensity Factor for Clamped SENT Specimen Containing Non-Straight Crack Front and Side Grooves

Yifan Huang, Wenxing Zhou

PII: S0167-8442(17)30047-2

DOI: <http://dx.doi.org/10.1016/j.tafmec.2017.07.011>

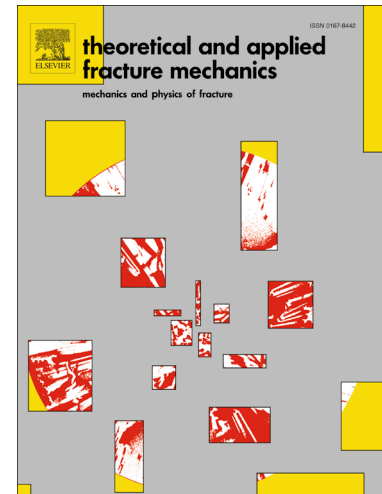
Reference: TAFMEC 1916

To appear in: *Theoretical and Applied Fracture Mechanics*

Received Date: 25 January 2017

Revised Date: 22 April 2017

Accepted Date: 12 July 2017



Please cite this article as: Y. Huang, W. Zhou, Stress Intensity Factor for Clamped SENT Specimen Containing Non-Straight Crack Front and Side Grooves, *Theoretical and Applied Fracture Mechanics* (2017), doi: <http://dx.doi.org/10.1016/j.tafmec.2017.07.011>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Stress Intensity Factor for Clamped SENT Specimen Containing Non-Straight Crack Front and Side Grooves

Yifan Huang^{a, b, *} and Wenxing Zhou^c

^a *Department of Civil and Environmental Engineering, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario K1S 5B6, Canada*

^b *School of Engineering Science, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia V5A 1S6, Canada*

^c *Department of Civil and Environmental Engineering, The University of Western Ontario, 1151 Richmond Street, London, Ontario N6A 5B9, Canada*

*: *Corresponding author, Email: yifan.huang@carleton.ca*

Abstract: Three-dimensional (3D) finite element analyses (FEA) of clamped single-edge notched tension (SENT) specimens are performed to evaluate the stress intensity factor (SIF). Both the average and local SIF values over the crack front are evaluated. Plane-sided (PS) specimens containing both straight and curved crack fronts and side-grooved (SG) specimens containing straight crack fronts are considered including six average crack lengths (i.e. $a_{ave}/W = 0.2$ to 0.7). PS specimens with three thickness-to-width ratios (i.e. $B/W = 0.5, 1$ and 2) are analyzed. The curved crack front is assumed to be bowed symmetrically and characterized by a power-law expression with a wide range of curvatures. For SG specimens, one relative thickness ($B/W = 1$) and ten depths of side groove are considered. The 3D SIF are compared with the present two-dimensional (2D) SIF. It is observed that the 2D SIF are sufficient as the difference between the 2D and 3D SIFs is in general within 10% if the crack front straightness requirements reported in the literature is satisfied. An empirical 3D SIF solution is developed that can potentially serve as a driving force for an assessment in actual structures that has similar crack geometries and loading configurations.

Keywords: Stress intensity factor (SIF); Three-dimensional finite element analysis (3D FEA); Single-edge notched tension (SENT); Crack front curvature; Side groove

Download English Version:

<https://daneshyari.com/en/article/7196237>

Download Persian Version:

<https://daneshyari.com/article/7196237>

[Daneshyari.com](https://daneshyari.com)