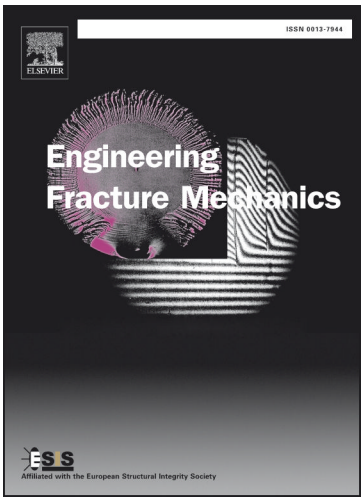
Accepted Manuscript



Review and evaluation of weight functions and stress intensity factors for edge-cracked finite-width plate

X.R. Wu, D.H. Tong, X.C. Zhao, W. Xu

PII: S0013-7944(18)30163-2
DOI: https://doi.org/10.1016/j.engfracmech.2018.04.001
Reference: EFM 5927

To appear in: *Engineering Fracture Mechanics*

Received Date: 12 February 2018
Revised Date: 24 March 2018
Accepted Date: 3 April 2018

Please cite this article as: Wu, X.R., Tong, D.H., Zhao, X.C., Xu, W., Review and evaluation of weight functions and stress intensity factors for edge-cracked finite-width plate, *Engineering Fracture Mechanics* (2018), doi: https://doi.org/10.1016/j.engfracmech.2018.04.001

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.

ACCEPTED MANUSCRIPT

Review and evaluation of weight functions and stress intensity factors for edge-cracked finite-width plate

X. R. Wu*[1], D. H. Tong[1], X.C. Zhao[1], W. Xu[2]

[1]AECC Beijing Institute of Aeronautical Materials, Beijing 100095, China

[2] School of Aeronautics and Astronautics, Shanghai Jiao Tong University, Shanghai 200240, China

ECFWP WF for EFM 20180212

HIGHLIGHTS:

- A comprehensive review of existing WFs for edge-cracked finite width plate is made.
- Accuracy of various ECFWP WFs is rigorously evaluated by using Greens functions.
- Applicable ranges of different analytical ECFWP WFs are identified.
- A highly accurate and wide-ranging analytical ECFWP WF is presented.
- Closed form stress intensity factors for various load cases are given.

ABSTRACT:

Various analytical and numerical weight functions (WFs) for the edge-cracked finite-width plate (ECFWP) configuration have been developed in the literature for efficient fracture mechanics analyses involving complicated/arbitrary load conditions. The objective of this paper is to make a comprehensive review and critical evaluation of the existing WFs determined by using various approaches, e.g. singular integral equation methods; one/two reference load case(s) based analytical approaches; fitting and interpolation to handbook solutions; numerical methods such as the complex Taylor series expansion and finite element analysis. The accuracy levels of existing WFs are assessed in rigorous manner by benchmarking the corresponding Green's functions (GFs) against well-recognized accurate solutions. A highly accurate and wide-ranging analytical ECFWP WF is presented in closed form. Stress intensity factor and crack opening displacement solutions for various load cases of practical interest are easily determined with high accuracy by using the well-verified analytical ECFWP WF for this crack configuration to demonstrate the methods.

Keywords:

Weight function; Stress intensity factor; Crack opening displacement; Green's function; Accuracy assessment; Edge-cracked finite-width plate.

Download English Version:

https://daneshyari.com/en/article/7168846

Download Persian Version:

https://daneshyari.com/article/7168846

Daneshyari.com