

# Author's Accepted Manuscript

Analysis of cracked bars with rectangular cross-section and isotropic coating layer under torsion

A.R. Hassani, M.M. Monfared



PII: S0020-7403(17)30150-9

DOI: <http://dx.doi.org/10.1016/j.ijmecsci.2017.04.005>

Reference: MS3652

To appear in: *International Journal of Mechanical Sciences*

Received date: 17 January 2017

Revised date: 13 March 2017

Accepted date: 7 April 2017

Cite this article as: A.R. Hassani and M.M. Monfared, Analysis of cracked bar with rectangular cross-section and isotropic coating layer under torsion. *International Journal of Mechanical Sciences* <http://dx.doi.org/10.1016/j.ijmecsci.2017.04.005>

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 galley proof before it is published in its final citable 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

# Analysis of cracked bars with rectangular cross-section and isotropic coating layer under torsion

A. R. Hassani<sup>1\*</sup>, M. M. Monfared<sup>2</sup>

<sup>1</sup>Young Researchers and Elite Club, Hashtgerd Branch, Islamic Azad University, Alborz, Iran.

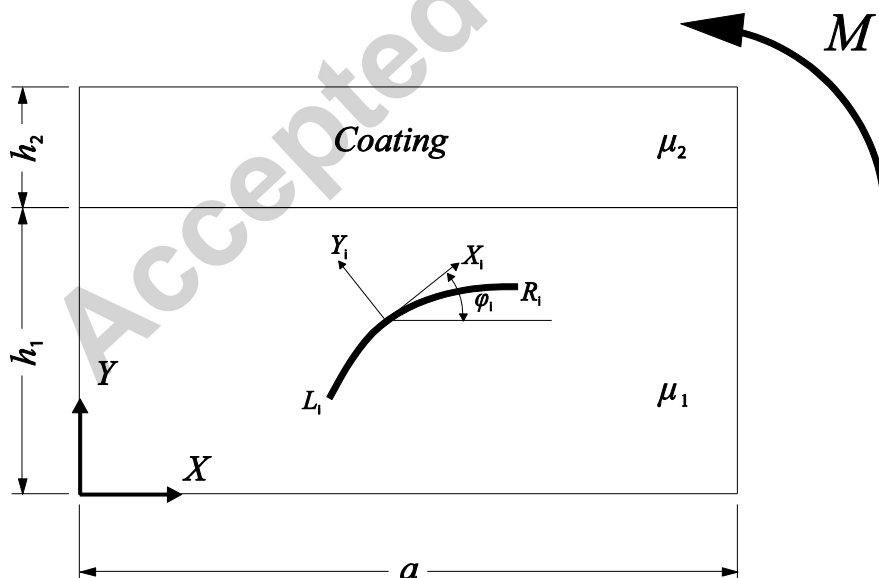
<sup>2</sup>Department of Mechanical Engineering, Hashtgerd Branch, Islamic Azad University, P.O. Box 33615-178, Alborz, Iran.

\*Corresponding author. Tel.: +98 26 442 0163. ahassani1111@gmail.com

## Abstract

The solution to problem of a Volterra-type screw dislocation in a rectangular cross section bar with an isotropic coating is first achieved by means of a finite Fourier cosine transform. The bar is under axial torque which is governed by Saint-Venant torsion theory. The series solution is then derived for warping function and stress fields in the rectangular cross section with an isotropic coating. The dislocation solution is employed to derive a set of Cauchy singular integral equations for the analysis of smooth cracks. The solution of these equations is used to determine the torsional rigidity of bar and the stress intensity factors for the crack tips. Finally, several examples are presented to show the accuracy and efficiency of the dislocation technique in Saint-Venant torsion problems.

Graphical abstract



**Keywords:** Rectangular cross section; Coating; Saint-Venant torsion; Stress intensity factors; Torsional rigidity; Dislocation density

Download English Version:

<https://daneshyari.com/en/article/5016138>

Download Persian Version:

<https://daneshyari.com/article/5016138>

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