

Fracture Mechanics

Edited by
Alexander Balankin, José Martínez Trinidad
and Orlando Susarrey Huerta

Fracture Mechanics

Edited by
Alexander Balankin
José Martínez Trinidad
Orlando Susarrey Huerta

Fracture Mechanics

Selected, peer reviewed papers from the
Symposium 8 Fracture Mechanics from the
XVIII International Materials Research,
Cancún, Quintana Roo.
August 16-20, 2009 México

Edited by

Alexander Balankin

José Martínez Trinidad

Orlando Susarrey Huerta

 **TRANS TECH PUBLICATIONS LTD**

Switzerland • UK • USA

Copyright © 2010 Trans Tech Publications Ltd, Switzerland

All rights reserved. No part of the contents of this publication may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

Trans Tech Publications Ltd
Laubisrutistr. 24
CH-8712 Stafa-Zurich
Switzerland
<http://www.ttp.net>

Volume 449 of
Key Engineering Materials
ISSN 1013-9826
Full text available online at <http://www.scientific.net>

Distributed worldwide by
Trans Tech Publications Ltd.
Inc.
Laubisrutistr. 24
CH-8712 Stafa-Zurich
Switzerland

Fax: +41 (44) 922 10 33
e-mail: sales@ttp.net

and in the Americas by
Trans Tech Publications
PO Box 699, May Street
Enfield, NH 03748
USA

Phone: +1 (603) 632-7377
Fax: +1 (603) 632-5611
e-mail: sales-usa@ttp.net

PREFACE

The XVIII International Materials Research Congress 2009 (IMRC 2009) was held in Cancun, Quintana Roo, México, a city framed by the beautiful Mexican Caribbean, from August 16 to 20, 2009. Within the scientific program of IMRC 2009, twenty three symposia were organized. This special publication presents the selected peer review papers of the symposium 8: Fracture Mechanics.

Since 1991, the International Materials Research Congress (IMRC) takes place every year in the beautiful city of Cancun, and is the most important annual event of the Mexican Materials Research Society (MRS-Mexico). The aim of the congress is to gather a group of scientist who carry out research in the field of Materials Science, in a forum to discuss and exchange ideas, mutual interests and the latest developments in the field of Materials Science.

The year 2009 marked the tenth edition of the Fracture Mechanics Symposium within the IMRC. The symposium has covered topics related to aspects in the mechanics and phenomena of fracture, fatigue, fractal mechanics approach, strength of materials, failure analysis, and in general structural integrity. During these ten years, the symposium has provided an ideal environment for a group of scientists and engineers to gather and interact in a personal basis.

This special issue was the product of the hard work and dedication of the authors who participated during the symposium and who brought and share their work. Special thanks to the selfless participation of the reviewers who devoted their time and effort, to whom we are greatly indebted.

We want to give special thanks to the organizing committee of the congress. Finally, we gratefully acknowledge the support of CONACYT through Project No.82668. Our gratitude is due to all those who have worked to make this symposium an exciting and fruitful meeting.

SSM Board

President

Dr. Luis Enrique Sansores Cuevas
Universidad Nacional Autónoma de México

Vice-president

Dr. Gonzalo González Reyes
Instituto de Investigaciones en Materiales, UNAM.

Secretary

Dr. Luis Fuentes Cobas
Centro de Investigaciones en Materiales Avanzados

Treasurer

Dr. María Elena Villafuerte Castrejón
Instituto de Investigaciones en Materiales, UNAM

General Chairman

Dr. Luis Enrique Sansores Cuevas
Universidad Nacional Autónoma de México

Dr. Allan T. Hurd

Los Alamos National Laboratory

Organizing Committee

Dr. Pedro Hugo Hernández Tejeda
Benemérita Universidad Autónoma de Puebla
Coordinator

Dr. José Luis Ruvalcaba Sil
LASMAL

Dr. José G. Chacón Nava
NACE

Table of Contents

Preface

Committees

Analysis of Material Properties for the Numerical Simulation of Fatigue Crack Growth under Variable Amplitude Loading A.A. Aguilar Espinosa, N. Fellows and O. Portillo	1
Fracture Indentation on AISI 1018 Borided Steels I. Campos-Silva, M. Ortíz-Domínguez, E. Hernández-Sánchez, D. Bravo-Bárceñas, O. Bravo-Bárceñas, M.A. Doñu-Ruíz, J. Martínez-Trinidad, J.A. Jiménez-Bernal and Y. Domínguez-Galicia	9
The Effects of UIT in the Fatigue Life of Al 2024-T3 M. Castillo-Morales and A. Salas-Zamarripa	15
Self-Affine Crack Pattern in Filter Paper Sheets C.A. Mora Santos, M.d.R. Rivera Martínez, O. Susarrey Huerta, A. Balankin and M. Mendoza Nuñez	23
Stationary Position for Hybrid Journal Bearing with Horizontal Point Injection Ports V.R. Nossov, J.C. Gómez-Mancilla, I. Ramirez-Vargas and D.E. Rivera-Arreola	29
The Boundary Element Method Applied to Visco-Plastic Analysis E. Pineda, M.H. Aliabadi and J. Zapata	37
Material Characterization for Dynamic Simulation of Non-Homogeneous Structural Members J.A. Quintana-Rodríguez, J.F. Doyle, F.J. Carrión-Viramontes, D. Samayoa-Ochoa and J.A. López-López	46
Numerical Formulation to Study Fluid-Solid Interfaces Excited by Elastic Waves A. Rodríguez-Castellanos, E. Flores Mendez, F.J. Sánchez-Sesma and J.E. Rodríguez-Sánchez	54
Corrosion Degradation of Pipeline Carbon Steels Subject to Geothermal Plant Conditions C. Miranda-Herrera, I. Saucedo, J. González-Sánchez and N. Acuña-González	62
Surface Stress Concentration Analysis of Shot Peened Aluminium Alloys J. Solís-Romero, J. Oseguera-Peña, J. Verduzco-Martínez and J. González-Sánchez	70
Mechanical Behavior of Ceramic and Polymer Composites Reinforced with Volcanic Ashes J.L. Soto Trinidad, J. Vite, A. Franco, M. Mendoza Nuñez and C.d.C. Gutiérrez Torres	77
Stress State Localized Analysis on the Tip of the Crack P.A. Tamayo Meza, P.S. Schabes-Retchkiman, A. Lazo Noguez and V.A. Yermishkin	87
New Theoretical Approach of the Fracture Ductility of Steels and its Relation with the Microscopy Structural Characterization V.A. Yermishkin, P.A. Tamayo Meza, N. Muñoz Aguirre, M. Mendez Arait and D. Vilchis Leonardo	96
Very High Cycle Fatigue Analysis of High Strength Steel with Corrosion Pitting R. Perez Mora, G. Domínguez Almaraz, T. Palin-Luc, C. Bathias and J.L. Arana	104