Fatigue & Fracture Mechanics

35th Volume

Richard E. Link
Kamran M. Nikbin
Editors

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Richard E. Link and Kamran M. Nikbin, editors

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Foreword

The Fifth International ASTM/ESIS Symposium on Fatigue and Fracture (35th ASTM National Symposium on Fatigue and Fracture Mechanics) was held in Reno, Nevada on 18-20 May 2005. ASTM International Committee E08 on Fatigue and Fracture and the European Structural Integrity Society (ESIS) served as sponsors. The symposium chairmen and co-editors of this volume were Richard E. Link, United States Naval Academy, Annapolis, MD and Kamran Nikbin, Imperial College, London, England.

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ENVIRONMENTAL FRACTURE

FRACTURE MECHANICS ANALYSIS

FRACTURE TOUGHNESS AND CONSTRAINT

DUCTILE-BRITTLE TRANSITION

DYNAMIC FRACTURE

Overview

This book is a presentation of work of several authors at the Fifth International ASTM/ESIS Symposium on Fatigue and Fracture, May 18–20, 2005, Reno, NV. Fatigue and fracture methodologies depend upon robust and accurate models of the damage accumulation and failure mechanisms that operate within the structures as well as an accurate characterization of the material response to the combined effects of loading, loading rate and environmental conditions. The combination of competing failure mechanisms and varying environmental conditions during the operational life of a component can make it a challenge to accurately predict its life. Hence the scope for this symposium captures the latest research covering state of the art work on fracture mechanics related topics such as fracture, fatigue, residual stress, creep, creep/fatigue, constraint and stress corrosion and links them to concepts used in structural integrity assessment. Furthermore the subject does not restrict itself to metallic materials but is applicable to polymers, composites as well as inhomogeneous materials. Papers and presentations delivered by nationally and internationally recognized authors were chosen to cover the general areas of modelling, testing and validation in crack dominant related research. It is felt that improvements in life assessment methods will only come about when validated fracture mechanics models are developed to produce verifiable predictions. Hence an emphasis on linking experimental and modelling techniques in the papers published in this volume should lead to the development of more accurate life assessment methods.

The papers contained in this publication represent the commitment of the ASTM Committee E-08 to providing the latest research information in the wide-ranging fracture mechanics field. The themes in the papers cover experimental results coupled to modelling techniques of linear, non-linear, time independent and dependant behaviour of cracked geometries of a range of materials. Papers relating to residual stress, crack tip constraint and probabilistic methods of analyses also highlight the importance of developing these fields for future improvements in life assessment methods.

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