FRACTURE MECHANICS

26TH VOLUME

Walter G. Reuter,
John H. Underwood and
James C. Newman, editors

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The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of these peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution to time and effort on behalf of ASTM.

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Foreword

The Twenty-Sixth National Symposium on Fracture Mechanics was held June 28–30, 1994 in Idaho Falls, ID. ASTM Committee E08 on Fatigue and Fracture was the sponsor. The individuals responsible for organizing the meeting consisted of W. G. Reuter, Idaho National Engineering Laboratory (Lockheed Martin Idaho Technologies), who served as the symposium chairman, J. C. Newman, Jr., NASA Langley Research Center, J. H. Underwood, Army Armament Research/Development and Engineering Center, and Linda L. Reuter, Idaho Falls, ID, who was responsible for developing the women's program and locating the banquet speaker. The symposium chairman would like to express his appreciation to Dorothy A. Cullen at the Idaho National Engineering Laboratory for all her support during the planning of the symposium and the publishing of the STP. The publication was edited by W. G. Reuter, J. H. Underwood, and J. C. Newman, Jr.

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Overview

The ASTM National Symposium on Fracture Mechanics is sponsored by ASTM Committee E08 on Fatigue and Fracture Testing. The original objective of these symposia was to promote technical interchange between researchers from the United States and worldwide in the field of Fracture. This objective was recently expanded to promote technical interchange between researchers in the field of fatigue and fracture. The meeting attracted about 100 researchers covering a broad range of issues in constraint, weldments, advanced materials, and practical applications.

The volume opens with the paper by Merkle who delivered the Fifth Annual Jerry L. Swedlow Memorial Lecture at this symposium. Merkle's presentation provided a brief philosophical and historical overview of applied fracture mechanics, particularly as it pertains to the safety of pressure vessels. The importance of constraint, a fundamental aspect of fracture mechanics in which Jerry Swedlow had a keen interest and made valuable contributions, was presented along with the need for physically realistic analysis. Additional insight into constraint effects on fracture toughness was developed by considering the roles played by the plastic strains, as well as the stresses that develop near a crack tip.

There are 42 papers following the Merkle paper that are broadly grouped in the same categories used to separate the presentation at the symposium. The constraint issue was separated into Crack Initiation with seven papers examining J or CTOD, and Crack Growth with seven papers investigating plane strain or plane stress conditions. Following these papers, there is a section on Weldment with eight papers. These papers are primarily concerned with effects of weld metal mismatch on the fracture process. The remaining papers discuss strain aging and nodular cast iron. The next section on Engineered Materials contains nine papers that cover a variety of topics consisting of monotonic or cyclic loading of ceramics, composites, adhesive joints, graded materials, paper, and an Al-Li alloy. The last three sections consist of Subcritical Crack Growth with five papers that present results of studies on fatigue, creep, or stress corrosion crack growth; Dynamic Loading with two papers; and Applications with four papers.

The technical quality of these papers is due to the authors and to the fine reviews provided by the reviewers. The symposium organizers would like to express our appreciation to all reviewers for a job well done. Because of the large number of papers, camera-ready manuscripts were used to develop the STP. The organizers of the symposium hope that it meets your approval.

The National Symposium on Fracture Mechanics is often used to present ASTM awards to recognize the achievement of current researchers. At the Twenty-Sixth Symposium, the award for the Jerry L. Swedlow Memorial Lecture was presented to Dr. John G. Merkle, Oak Ridge National Laboratory. The Award of Merit was presented to Professor Ashok Saxena, Georgia Institute of Technology. Awards of Appreciation were presented to Dr.

Mark T. Kirk, Dr. James C. Newman, Jr., and to Professor Ad Bakker, Delft University of Technology. The organizing committee would like to congratulate the above award winners as considerable time, effort, and hard work were required to win these awards.

Walter Reuter
EG&G Idaho Ink,
Idaho Falls, ID; symposium
chairman and editor.

John H. Underwood
U.S. Army Armament RD Center
Watervliet, NY; symposium
co-chairman and editor.

James C. Newman, Jr.
NASA Langley Research Center
Hampton, VA; symposium
co-chairman and editor.

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