

Introduction

Developments in the field of fracture mechanics have exerted a strong influence upon the advancement of structural technology during the past decade. Papers which chronicle an important part of these developments have been published in various ASTM special technical publications (STP). This volume consists of the Proceedings of the Eleventh National Symposium on Fracture Mechanics which is sponsored by ASTM Committee E-24 on Fracture Testing. The main body of the proceedings, consisting solely of contributed papers, presents an overview of the current state of analytical and experimental research as viewed by those members of the international technical community who participated in the Symposium. A separate publication on Brittle Fracture, ASTM STP 678, consisting solely of solicited papers, has recorded the proceedings of those special sessions of the Symposium. This publication delineates frontiers of research in the several areas of fracture mechanics which are addressed herein and should be of interest to scientists and engineers wishing to keep abreast of such developments.

Specifically, this volume documents progress in research in several areas; the area of greatest activity being that of fatigue crack growth. Papers which study the influence upon fatigue crack growth of combined fields, nonperiodic load spectra, temperature effects, crack closure and residual stresses, notches, and other effects are included. Both analytical and experimental studies on stress intensity distributions and shapes of surface flaws involving finite element, boundary integral-weight function, photoelastic, and overload marking techniques are included. Research on experimental techniques and the analysis of specimens is reported together with new results on K_{Ic} - J_{Ic} determination and elastic-plastic fracture analysis. Three papers are included which deal with the fracture of composite materials. Finally, a series of papers dealing with topics outside of the above areas which were designated as special topics are included along with a group of papers illustrating the application of fracture mechanics to problems of current and future technological importance.

A feature of the Eleventh National Symposium was the announcement by Committee E-24 Chairman J. G. Kaufman of the establishment of the George Rankin Irwin Medal to be awarded annually to the outstanding young researcher in the field of Fracture Mechanics. The first medal was presented to Dr. Irwin at the Symposium.

The value of the Eleventh National Symposium on Fracture Mechanics is evidenced by the contents of this volume and *ASTM STP 678*. The contributions of the symposium organizing committee, the authors, reviewers, referees, J. J. Palmer and J. B. Wheeler of the ASTM and their staffs, together with the participation and support of P. E. Torgersen, Dan Frederick and J. D. Wilson of Virginia Polytechnic Institute and State University are gratefully acknowledged.

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