

Introduction

In the 19 years of the National Symposium on Fracture Mechanics, the field of fracture mechanics has undergone considerable maturation. Much of the maturation of this critical technology is the direct result of work accomplished by members of ASTM Committee E-24 on Fracture Testing and the supporting analysis efforts. A significant amount of that effort has been reported in ASTM Special Technical Publications, such as the current volume. The quality of the research can be seen in the importance attached to these volumes and in the expertise of the reviewers, whose work is essential to the production of these volumes.

The goal of the Nineteenth National Symposium on Fracture Mechanics, on which this publication is based, was the identification of major issues in the principle technology subdivisions of fracture mechanics: three-dimensional issues, computational and analytical issues, damage tolerance and fatigue, elastoplastic fracture, dynamic inelastic fracture, and crack arrest theory and applications. Leading developers and applications engineers contributed to these focused sessions. The quality of these sessions, and of this volume, is due to these organizers: Professors J. L. Swedlow, C. W. Smith, and G. T. Hahn; Drs. J. C. Newman and M. F. Kanninen; and Messrs. D. P. Wilhem, T. Swift, and M. Vagins.

The emphasis throughout this volume is on reduction to practice. The quality of the research effort in the field of fracture mechanics can be seen in the success that has been achieved in the past 19 years in solving so many of the critical issues of test methodology, analytical and computational modeling, nonlinear behavior, damage tolerance, nonlinear fatigue crack growth behavior, and other issues. The major new area of research is dynamic fracture, as shown by the numerous contributions contained in this volume. Of greatest importance is the very large effort sponsored by the Nuclear Regulatory Commission to develop methodologies for predicting the arrest of a running crack in materials of variable toughness conditions. There are numerous ongoing experimental and numerical tasks related to this problem, and further developments are expected in the near future.

The National Symposium on Fracture Mechanics is also an opportunity for ASTM Committee E-24 on Fracture Testing to honor its members. This year Dr. J. C. Newman, Jr., was awarded the ASTM Award of Merit for his numerous contributions to the literature and to Committee E-24.

The real success of the 19th symposium as a forum for key researchers and appliers of the art of fracture mechanics is due to the local arrangements staff. Without the key support of Cathy Dean and Beatrice Moreno at Southwest Research Institute, this symposium would not have taken place in San Antonio. I heartily thank both of them, especially Ms. Dean for her patience and endurance. I would also like to thank Steve Hudak and Dr. Mel Kanninen for their helpful advice.

Thomas A. Cruse

Southwest Research Institute, San Antonio, TX
78284; symposium chairman and editor.