

## Overview

---

The National Symposium on Fracture Mechanics has evolved, since its beginnings in 1965, into an annual forum for the exchange of ideas related to the fracture of engineering materials. The Twenty-Third National Symposium carried on this tradition and was held in College Station, Texas, on 18–20 June 1991. The symposium was sponsored by ASTM Committee E24 on Fracture Testing, with the cooperation and support of the Department of Mechanical Engineering at Texas A&M University.

The diversity of interests and the wide range of problem areas in which fracture mechanics can play a role in ensuring structural integrity was reflected in the topic areas that were addressed in the 63 papers that were presented at the symposium. The symposium drew 110 attendees from 18 countries around the world, highlighting the strong international flavor that the National Symposium and ASTM's fracture-related activities have acquired over the years.

The efforts of the authors of the manuscripts submitted for publication and the diligence of the persons entrusted with the task of peer-reviewing these submittals have resulted in the compilation of papers that appear in this volume. These papers represent a broad overview of the current state of the art in fracture mechanics research and should serve as a timely recording of advances in basic understanding, as a compilation of the latest test procedures and results, as the basis of new insights and approaches that would be of value to designers and practitioners, and as a stimulus to future research.

The volume opens with the paper by Dr. John M. Barsom, who delivered the Second Annual Jerry L. Swedlow Memorial Lecture at this symposium. Barsom's presentation addressed the need for a better understanding of the basic issues involved in several different structural applications of fracture mechanics technology. As such, it serves as a road map for future directions and is a highly appropriate tribute to the memory of the individual who played a very important role in shaping the National Symposium into the forum that it is today.

Following the Swedlow Lecture are forty-five papers that have been broadly grouped into seven topical areas, based on the main theme of each paper. These groupings are, however, only intended as an aid to the reader, since no classification can ever be absolute. Topics of interest to a particular reader will therefore be found throughout this volume, and the reader is encouraged to consult the Index for the location of topics of specific interest.

The groupings that have been adopted are detailed next and are similar to the broad categories that were used to divide the presentations into coherent topical sessions at the symposium itself. The first group of nine papers addresses analytical and constraint-related issues in elastic-plastic fracture mechanics, with much of the emphasis being on topics related to transition range behavior. The next section of seven papers also deals with elastic-plastic fracture, but emphasizes applications. Following this are two sections that both address linear-elastic fracture mechanics, with a group of three papers emphasizing analytical aspects, and a group of four papers that are more applications oriented. Subcritical crack growth and nondestructive evaluation methods are the joint themes of the next group of eight papers. Following this are eleven papers addressing the fracture of composites and nonmetals, a topic area that is receiving increasing attention from the fracture community and which had significant repre-

sentation at a National Symposium for the first time. Finally, a grouping of three papers dealing with probabilistic and dynamic issues closes out this volume.

In addition to the technical program, a highlight of the symposium was the presentation by Dr. George R. Irwin of the 1991 medal named in his honor to Dr. Hugo A. Ernst of the Georgia Institute of Technology, and the presentation by Dr. C. Michael Hudson, Chairman of Committee E24, of the 1991 Award of Merit and designation of Fellow of ASTM to Dr. Richard P. Gangloff of the University of Virginia.

The Symposium Organizing Committee consisting of Prof. T. L. Anderson, Prof. R. Chona, Dr. J. P. Gudas, Dr. W. S. Johnson, Jr., Prof. V. K. Kinra, Prof. J. D. Landes, Mr. J. G. Merkle, Prof. R. J. Sanford, and Mr. E. T. Wessel are pleased to have been a part of this very significant technical activity. The committee and the symposium chairman in particular would like to express their appreciation of the support received from the authors of the various papers presented at the symposium; of the thoroughness of the peer-reviewers who have played a major role in ensuring the technical quality and archival nature of the contents of this publication; of the efforts by various ASTM staff to help make the symposium and this volume a success, particularly Mr. P. J. Barr, Ms. L. Hanson, Ms. H. M. Hoersch, Ms. M. T. Pravitz, Ms. D. Savini, and Ms. N. Sharkey; and of the support, encouragement, and assistance extended by Prof. W. L. Bradley, Head of the Department of Mechanical Engineering at Texas A&M University. Finally, the symposium chairman would like to especially thank Ms. Katherine A. Bedford, Staff Assistant at Texas A&M University, for all her contributions during the planning of the symposium and the preparation of this volume.

*Ravinder Chona*

Department of Mechanical Engineering, Texas  
A&M University, College Station, Texas;  
symposium chairman and editor.