

Introduction

The ASTM Symposium on Composite Materials: Fatigue and Fracture was held on 24–25 October 1984 in Dallas/Ft. Worth, Texas. It was sponsored by ASTM Committee D-30 on High Modulus Fibers and Their Composites.

The main purpose of the symposium was to provide a forum for presentation and discussion on the recent developments in fatigue and fracture of composites. Specifically called for were papers describing experimental and analytical research in the following areas of composites technology: failure mechanisms and fractography, nondestructive evaluation, material improvement, environmental effects, time-dependent behavior, design implications, prediction methodology, and reliability aspects.

Not so long ago, one of the frequently asked questions was, “Is fracture mechanics applicable to composites?” Now we no longer ask the same question. We use the fracture mechanics methodology to analyze matrix/interface-controlled subcritical fracture such as ply cracking and delamination. The question we hear quite often these days is, “Composites have no fatigue problems. Why do we need to study fatigue of composites?” We only wish we could repeat the same question in the years to come.

The papers included in this volume address many of the important aspects of fatigue and fracture behavior of composite materials. Although most of the papers are on graphite/epoxy laminates, some discussion can be found on metal matrix composites as well as on unidirectional composites. There is an overall emphasis on the identification of damage mechanisms and on the development of prediction methodology for the formation and effect of damage based on the physics and mechanics of damage details. Such an emphasis will eventually point the way toward further material improvements and more efficient design for fatigue.

This symposium volume is the result of collective effort by many people involved. First of all, I would like to thank the symposium committee for their invaluable help in putting this program together. The members of the committee are Bob Badalian of Naval Research Laboratory, Dave Glasgow of Air Force Office of Scientific Research, C. T. Sun of Purdue University, and Jerry Williams of NASA Langley Research Center. Grateful appreciation is also extended to the authors, the reviewers, and the ASTM staff for their generous contributions to this volume.

H. Thomas Hahn

Center for Composites Research, Washington
University, St. Louis, MO; symposium chair-
man and editor.