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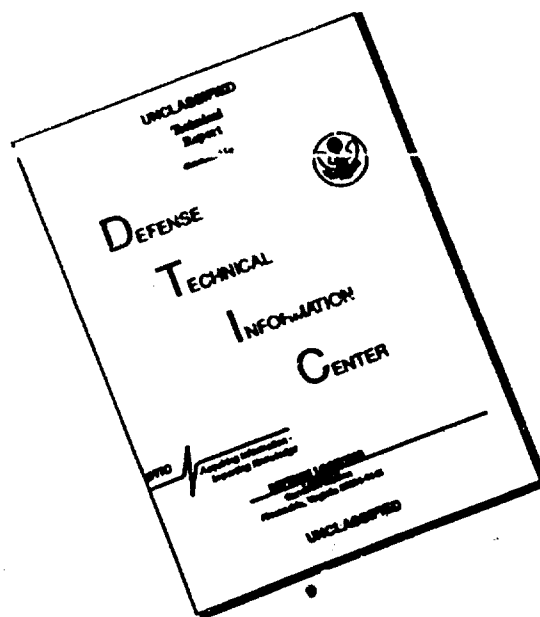
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International Union of Theoretical  
and Applied Mechanics

George J. Dvorak (Ed.)

# **Inelastic Deformation of Composite Materials**

IUTAM Symposium, Troy, New York  
May 29–June 1, 1990

With 101 Illustrations



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## Preface

In the last 25 years, the science and technology of composite materials have experienced a period of substantial development. The initial goal was to provide light, strong, and stiff materials for the aerospace industry. That was met by the introduction of polymer matrix composites with continuous fiber reinforcement, and with certain discontinuous reinforcements. Such materials are now routinely used not only in aerospace, but also in numerous other applications, e.g., in automobile and construction industries.

Meanwhile, composite materials have been introduced, or are expected to serve, in many other functions which cannot be fulfilled by conventional materials, particularly in extreme environments. Accordingly, the research focus has been broadened to include not only new polymer systems, but also metal, intermetallic, and ceramic matrix materials. This has brought forth a number of new problems in fabrication and processing, and in analysis of composite material behavior and properties.

The latter set of problems is usually approached by various micromechanical techniques. In recent years, their scope has been expanded from prediction of overall properties of elastic, perfectly bonded systems, to include problems associated with inelastic deformation of the phases, debonding at interfaces, and growth of distributed damage. Many familiar aspects of mechanical behavior, such as fracture, fatigue, compressive strength and buckling have been reexamined and adapted for application to the new material systems.

This volume contains a selection of recent work by leading researchers in micromechanics that was presented at the IUTAM Symposium on Inelastic Deformation of Composite Materials at Rensselaer. The Symposium was made possible by the generous support of AFOSR, ARO, NSF, IUTAM and RPI. Thanks are due to the sponsors, and to the local organizing committee for their support and work on behalf of the Symposium. Special thanks are due to Christine Stephenson for her coordination of the local arrangements, and for her contribution to the preparation of this volume.

George J. Dvorak  
Troy, New York

June 1990

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