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Preface

The Symposium **Recent Developments in the Modelling of Rupture in Solids** was held in Fóz do Iguaçu, Brazil, from August 4th to 7th, 2003. The aim was to gather experts (and good friends as well) to present and discuss recent developments and the new trends in the description of fracture.

The variety of materials, service and loading conditions in engineering problems led to the development of different approaches to deal with fracture in real operating structures. With the exception of creep rupture, where Kachanov launched the basis of Damage Mechanics at the end of the fifties, Linear Fracture Mechanics was the only available tool up to the end of the sixties to predict fracture. In the beginning of the seventies, nonlinear aspects in Fracture Mechanics emerged together with a reappraisal of Continuum Damage Mechanics and the development of other tools such as the Gurson model in ductile rupture.

Two main difficulties were still attached to these tools in the beginning of the eighties: for some approaches, initiation of a crack was not considered and all the models that were used at that time did not contain a characteristic length so that the numerical results did not fit quite well with experimental observations. The nineties were marked by the emergence of the first integrated approaches to failure where initiation of a crack, its possible propagation and the final failure of the component were analyzed in a unified way.

The papers presented in the conference range from the fundamental problems related to initiation and growth of discontinuities in solids until their application in engineering problems. All types of materials (metals, ceramics, polymers, composites) and all types of loadings (quasi-static, dynamic, monotonic or cyclic) were considered so that six fields of research had been identified:

1. Crack initiation, crack propagation and failure in brittle materials
2. Damage, crack initiation, crack propagation and failure in ductile materials
3. Damage, crack initiation, crack propagation and failure in creeping solids
4. Crack initiation, crack propagation and failure at interfaces
5. Crack initiation, crack propagation and failure in coatings
6. Failure of framed structures

In each of these topics, experimental, theoretical and numerical issues were considered.

This special volume collects some of the papers presented in Fóz do Iguaçu, being representative of the state of art of researches on Mechanics of Materials.

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Guest Editors