Numerical Fracture Mechanics (Solid Mechanics and Its Applications)

By M.H. Aliabadi, D.P. Rooke

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The purpose of this book is to present, describe and demonstrate the use of numerical methods in solving crack problems in fracture mechanics. The text concentrates, to a large extent, on the application of the Boundary Element Method (BEM) to fracture mechanics, although an up-to-date account of recent advances in other numerical methods such as the Finite Element Method is also presented. The book is an integrated presentation of modem numerical fracture mechanics, it contains a compilation of the work of many researchers as well as accounting for some of authors' most recent work on the subject. It is hoped that this book will bridge the gap that exists between specialist books on theoretical fracture mechanics on one hand, and texts on numerical methods on the other. Although most of the methods presented are the latest developments in the field of numerical fracture mechanics, the authors have also included some simple techniques which are essential for understanding the physical principles that govern crack problems in general. Different numerical techniques are described in detail and where possible simple examples are included, as well as test results for more complicated problems. The book consists of six chapters. The first chapter initially describes the historical development of theoretical fracture mechanics, before proceeding to present the basic concepts such as energy balance, stress intensity factors, residual strength and fatigue crack growth as well as briefly describing the importance of stress intensity factors in corrosion and residual stress cracking.

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