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Stress Functions; 2.3 Basics of LEFM; 2.3.1 Fracture Mechanics; 2.3.2 Infinite Tensile Plate with a Circular Hole; 2.3.3 Infinite Tensile Plate with an Elliptical Hole; 2.3.4 Westergaard Analysis of a Line Crack; 2.3.5 Williams Solution of a Wedge Corner
2.4 Stress Intensity Factor, K2.4.1 Definition of the Stress Intensity Factor; 2.4.2 Examples of Stress Intensity Factors for LEFM; 2.4.3 Griffith Energy Theories; 2.4.4 Mixed Mode Crack Propagation; 2.5 Classical Solution Procedures for K and G; 2.5.1 Displacement Extrapolation/Correlation Method; 2.5.2 Mode I Energy Release Rate; 2.5.3 Mode I Stiffness Derivative/Virtual Crack Model; 2.5.4 Two Virtual Crack Extensions for Mixed Mode Cases; 2.5.5 Single Virtual Crack Extension Based on Displacement Decomposition; 2.6 Quarter Point Singular Elements; 2.7 J Integral; 2.7.1 Generalization of J
2.7.2 Effect of Crack Surface Traction2.7.3 Effect of Body Force; 2.7.4 Equivalent Domain Integral (EDI) Method; 2.7.5 Interaction Integral Method; 2.8 Elastoplastic Fracture Mechanics (EPFM); 2.8.1 Plastic Zone; 2.8.2 Crack-Tip Opening Displacements (CTOD); 2.8.3 J Integral for EPFM; 3 Extended Finite Element Method; 3.1 Introduction; 3.2 Historic Development of XFEM; 3.2.1 A Review of XFEM Development; 3.2.2 A Review of XFEM Composite Analysis; 3.3 Enriched Approximations; 3.3.1 Partition of Unity; 3.3.2 Intrinsic and Extrinsic Enrichments; 3.3.3 Partition of Unity Finite Element Method
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Sommario/riassunto

This book describes the basics and developments of the new XFEM approach to fracture analysis of composite structures and materials. It provides state of the art techniques and algorithms for fracture analysis of structures including numeric examples at the end of each chapter as well as an accompanying website which will include MATLAB resources, executables, data files, and simulation procedures of XFEM. The first reference text for the extended finite element method (XFEM) for fracture analysis of structures and materialsIncludes theory and applications, with worked n