



Fracture Mechanics: Fundamentals and Applications

By Surjya Kumar Maiti

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Fracture mechanics studies the development and spreading of cracks in materials. The study uses two techniques including analytical and experimental solid mechanics. The former is used to determine the driving force on a crack and the latter is used to measure material's resistance to fracture. The text begins with a detailed discussion of fundamental concepts including linear elastic fracture mechanics (LEFM), yielding fracture mechanics, mixed mode fracture and computational aspects of linear elastic fracture mechanics. It explains important topics including Griffith theory of brittle crack propagation and its Irwin and Orowan modification, calculation of theoretical cohesive strength of materials through an atomic model and analytical determination of crack tip stress field. This book covers MATLAB programs for calculating fatigue life under variable amplitude cyclic loading. The experimental measurements of fracture toughness parameters K_{IC}, J_{IC} and crack opening displacement (COD) are provided in the last chapter.

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Editorial Review

About the Author

Surjya Kumar Maiti is a Professor in the Department of Mechanical Engineering, Indian Institute of Technology, Bombay. He has more than thirty-five years of teaching and research experience and has published nearly 100 papers in national and international journals. He received his PhD from the Indian Institute of Technology, Bombay, and worked as postdoctoral assistant at the University of Cambridge for two years (1981-1983). He has taught courses on solid mechanics, strength of materials, stress analysis and pressure vessel design at both the undergraduate and postgraduate levels. His areas of research include fracture mechanics, finite element and boundary element methods, structural health monitoring and stress corrosion cracking.

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