



# Fracture Mechanics: Fundamentals and Applications

*Surjya Kumar Maiti*

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## **Fracture Mechanics: Fundamentals and Applications** Surjya Kumar Maiti

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<sub>IC</sub>, J<sub>IC</sub> and crack opening displacement (COD) are provided in the last chapter.

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