

Introduction to Fracture Mechanics

Robert O. Ritchie, Departments of Materials Science and Engineering and Mechanical Engineering, University of California, Berkeley, and Lawrence Berkeley National Laboratory, USA and **Dong Liu**, Lecturer, University of Bristol, UK

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AUDIENCE: Materials Scientists and Engineers in power generation, nuclear, aerospace, oil and gas, and related industries, as well as graduate and post-docs

SHELVING CLASSIFICATIONS:

General Materials Science, Materials Mechanics

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THEMA CLASSIFICATION:

THEMATGM

An introduction to fracture mechanics that is ideal for faculty, students and practicing engineers

KEY FEATURES

- Presents how, for a given material, a fracture toughness value can be measured on a small laboratory sample and then used directly to predict the failure (by fracture, fatigue, creep, etc.) of a much larger structure in service
- Covers the rudiments of fracture mechanics from the perspective of the philosophy underlying the few principles and the many assumptions that form the basis of the discipline
- Provides readers with a "working knowledge" of fracture mechanics, describing its potency for damage-tolerant design, for preventing failures through appropriate life-prediction strategies, and for quantitative failure analysis (fracture diagnostics)

DESCRIPTION

Introduction to Fracture Mechanics presents an introduction to the origins, formulation and application of fracture mechanics for the design, safe operation and life prediction in structural materials and components. The book introduces and informs the reader on how fracture mechanics works and how it is so different from other forms of analysis that are used to characterize mechanical properties. Chapters cover foundational topics and the use of linear-elastic fracture mechanics, involving both K-based characterizing parameter and G-based energy approaches, and how to characterize the fracture toughness of materials under plane-strain and non plane-strain conditions using the notion of crack-resistance or R-curves.

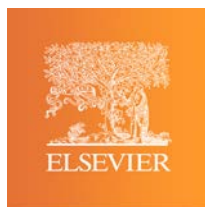
Other sections cover far more complex nonlinear-elastic fracture mechanics based on the use of the J-integral and the crack-tip opening displacement. These topics largely involve continuum mechanics descriptions of crack initiation, slow crack growth, eventual instability by overload fracture, and subcritical cracking.

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