

## Fractal Finite Element Method: For sensitivity and probabilistic fracture analysis of cracked structures

B.N. Rao, R. Munirami Reddy



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#### **Fractal Finite Element Method: For sensitivity and probabilistic fracture analysis of cracked structures** B.N. Rao, R. Munirami Reddy

This monograph presents a new fractal finite element method (FFEM) based continuum shape sensitivity analysis for a crack in a homogeneous, isotropic, and 2-D linear-elastic body subjected to mixed-mode loading conditions. The method is based on the material derivative concept of continuum mechanics, and direct differentiation. In addition this monograph presents probabilistic fracture mechanics analysis of linear-elastic cracked structures subjected to mixed-mode loading conditions using FFEM. The method involves FFEM for calculating fracture response characteristics; statistical models of uncertainties in load, material properties, and crack geometry; and the FORM for predicting probabilistic fracture response and reliability of cracked structures. The sensitivity of fracture parameters with respect to crack size, required for probabilistic analysis, is calculated using continuum shape sensitivity analysis. The monograph focuses on the work carried by the second author at Indian Institute of Technology Madras, India; as a part of his doctoral study.

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