Extended Finite Element Method: Theory and Applications (Wiley Series in Computational Mechanics)

By Amir R. Khoei

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Introduces the theory and applications of the extended finite element method (XFEM) in the linear and nonlinear problems of continua, structures and geomechanics

- Explores the concept of partition of unity, various enrichment functions, and fundamentals of XFEM formulation.
- Covers numerous applications of XFEM including fracture mechanics, large deformation, plasticity, multiphase flow, hydraulic fracturing and contact problems
- Accompanied by a website hosting source code and examples

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Editorial Review

From the Back Cover

The finite element method (FEM) technique has been developed to simulate and analyze complex engineering problems. However, there are a number of drawbacks with finite element simulation of discontinuous problems, such as fracture mechanics problems, including the computational cost of a very fine finite element mesh and the complex remeshing strategy in capturing discontinuity. The extended finite element method (XFEM) has therefore been developed to improve the performance of the conventional finite element method in discontinuity problems.

Extended Finite Element Method: Theory and Applications introduces the theory and applications of XFEM in the linear and nonlinear problems of continua, structures, and geomechanics. It begins by introducing the concept of a partition of unity, various enrichment functions, and fundamentals of XFEM formulation. It then covers the theory and application of XFEM in large deformations, plasticity, and contact problems. The implementation of XFEM in fracture mechanics, including linear, cohesive, and ductile crack propagation, is also covered. Finally, the theory and applications of XFEM in multiphase fluid flow, including hydraulic fracturing in soil saturated media and crack propagation in thermo-hydro-mechanical porous media, are discussed in detail.

Key features:

• Comprehensively introduces XFEM analysis

• Explains the theory and applications of XFEM in various continuum and geo-mechanical problems

• Includes worked examples

• Accompanied by a website hosting source code and examples

Extended Finite Element Method: Theory and Applications is a comprehensive introduction to XFEM analysis for researchers and practitioners in industry, and is also an ideal textbook for graduate students in mechanical and civil engineering.ccompanied by a website hosting source code and examples

About the Author
Amir R. Khoei, Sharif University of Technology, Iran

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