

# The Finite Element Method: Its Fundamentals and Applications in Engineering

John Zhangxin Chen



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### The Finite Element Method: Its Fundamentals and Applications in Engineering

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**The Finite Element Method: Its Fundamentals and Applications in Engineering** John Zhangxin Chen This Finite Element Method offers a fundamental and practical introduction to the finite element method, its variants, and their applications in engineering. Every concept is introduced in the simplest possible setting, while maintaining a level of treatment that is as rigorous as possible without being unnecessarily abstract. Various finite elements in one, two, and three space dimensions are introduced, and their applications to elliptic, parabolic, hyperbolic, and nonlinear equations and to solid mechanics, fluid mechanics, and porous media flow problems are addressed. The variants include the control volume, multipoint flux approximation, nonconforming, mixed, discontinuous, characteristic, adaptive, and multiscale finite element methods. Illustrative computer programs in Fortran and C++ are described. An extensive set of exercises are provided in each chapter. This book serves as a text a for one-semester course for upper-level undergraduates and beginning graduate students and as a professional reference for engineers, mathematicians, and scientists.

Readership: Upper-level undergraduates and beginning graduate students, researchers and industrialists dealing with finite element methods, numerical methods and finite element applications.

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