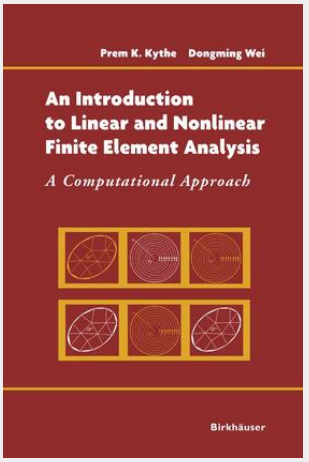
Kythe / Wei

An Introduction to Linear and Nonlinear Finite Element Analysis

A Computational Approach



Modern finite element analysis has grown into a basic mathematical tool for almost every field of engineering and the applied sciences. This introductory textbook fills a gap in the literature, offering a concise, integrated presentation of methods, applications, software tools, and hands-on projects. Included are numerous exercises, problems, and Mathematica/Matlab-based programming projects. The emphasis is on interdisciplinary applications to serve a broad audience of advanced undergraduate/graduate students with different backgrounds in applied mathematics, engineering, physics/geophysics. The work may also serve as a self-study reference for researchers and practitioners seeking a quick introduction to the subject for their research.

Although finite element courses have become more popular in the undergraduate and graduate engineering, science, and applied mathematics curricula, there are very few introductory textbooks geared toward students accustomed to using computers for everyday assignments and research. 'An Introduction to Linear and Nonlinear Finite Element Analysis' fills this gap, offering a concise, integrated presentation of methods, applications, computational software tools, and hands-on programming projects. Suitable for junior/senior undergraduate and first-year graduate courses, the book is aimed at students from a variety of disciplines: engineering, physics, geophysics, and applied mathematics. Unlike existing texts designed with specific applications to a particular field of mechanical, civil, or chemical engineering, the emphasis here is on interdisciplinary applications. One- and two-dimensional linear and nonlinear initial/boundary value problems are solved using finite element, Newton's, and conjugate gradient methods. Mathematical theory is kept to a minimum, making the text accessible to students with varied backgrounds. Features: * Software tools using Mathematica, Matlab, Fortran, and commercial finite element codes, such as Ansys, integrated throughout the text * Numerous examples and exercises with diverse applications to linear and nonlinear heat transfer, fluid flows, mechanical vibrations, electromagnetics, and structures * Supporting material and selected solutions to problems available at the authors' websites: http://www.math.uno.edu/fac/pkythe.html and http://www.math.uno.edu/fac/dwei.html * Minimal prerequisites: a course in calculus of several variables, differential equations and linear algebra, as well as some knowledge of computers Primarily a classroom resource, the book may also be used as a self-study reference for researchers and practitioners who need a quick introduction to finite element methods.

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