Finite Element Analysis of Structures through Unified Formulation, 1/e
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About the Book
The finite element method (FEM) is a computational tool widely used to design and analyse complex structures. Currently, there are a number of different approaches to analysis using the FEM that vary according to the type of structure being analysed: beams and plates may use 1D or 2D approaches, shells and solids 2D or 3D approaches, and methods that work for one structure are typically not optimized to work for another. Finite Element Analysis of Structures Through Unified Formulation deals with the FEM used for the analysis of the mechanics of structures in the case of linear elasticity. The novelty of this book is that the finite elements (FEs) are formulated on the basis of a class of theories of structures known as the Carrera Unified Formulation (CUF). It formulates 1D, 2D and 3D FEs on the basis of the same ‘fundamental nucleus’ that comes from geometrical relations and Hooke's law, and presents both 1D and 2D refined FEs that only have displacement variables as in 3D elements. It also covers 1D and 2D FEs that make use of 'real' physical surfaces rather than 'artificial' mathematical surfaces which are difficult to interface in CAD/CAE software.

Salient Features
Covers how the refined formulation can be easily and conveniently used to analyse laminated structures, such as sandwich and composite structures, and to deal with multifield problems
Shows the performance of different FE models through the ‘best theory diagram’ which allows different models to be compared in terms of accuracy and computational cost
Introduces an axiomatic/asymptotic approach that reduces the computational cost of the structural analysis without affecting the accuracy
Introduces an innovative 'component-wise' approach to deal with complex structures
Accompanied by a website hosting the dedicated software package MUL2

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About the Author
Erasmo Carrera - Erasmo Carrera is currently a full professor at the Department of Mechanical and Aerospace Engineering at Politecnico di Torino. He is the founder and leader of the MUL2 group at the university, which has acquired a significant international reputation in the field of multilayered structures subjected to multifield loadings, see also www.mul2.com. He has introduced the Unified Formulation, or CUF (Carrera Unified Formulation), as a tool to establish a new framework in which beam, plate and shell theories can be developed for metallic and composite multilayered structures under mechanical, thermal electrical and magnetic loadings. CUF has been applied extensively to both strong and weak forms (FE and meshless solutions). Carrera has been author and co-author of about 500 papers on structural mechanics and aerospace engineering topics. Most of these works have been published in first rate international journals, as well as of two recent books published by J Wiley & Sons. Carrera’s papers have had about 500 citations with h-index=34 (data taken from Scopus).

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