The Finite Element Method in Engineering, Fourth Edition

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出版者:Butterworth-Heinemann

出版时间:2004-12-20

装帧:Hardcover

isbn:9780750678285

Finite Element Analysis is an analytical engineering tool developed in the 1960's by the Aerospace and nuclear power industries to find usable, approximate solutions to problems with many complex variables. It is an extension of derivative and integral calculus, and uses very large matrix arrays and mesh diagrams to calculate stress points, movement of loads and forces, and other basic physical behaviors. Students will find in this textbook a thorough grounding of the mathematical principles underlying the popular, analytical methods for setting up a finite element solution based on those mathematical equations. It quickly bridges that knowledge to a host of real-world applications - from structural design, to problems in fluid mechanics and thermodynamics. Professional engineers will benefit from the introduction to the many useful applications of finite element analysis, and will gain a better understanding of its limitations and special uses. New to this edition: new sections added on the assemblage of element equations, and an important new comparison between finite element analysis and other analytical methods - showing advantages and disadvantages of each; updated solutions manual available; improved sample and end-of-chapter problems; the only book to provide a broad overview of the underlying principles of finite element analysis and where it fits into the larger context of other mathematically based engineering analytical tools; new sections added on the assemblage of element equations, and an important new comparison between finite element analysis and other analytical methods, showing the advantages and disadvantages of each; and, new Companion website that will host usable finite element programs and sample engineering problems, as well as a Solutions Manual for end-of-chapter problems.

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