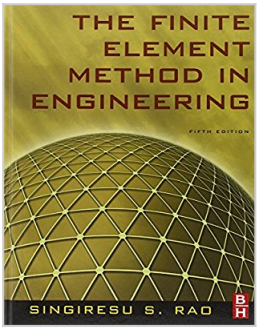

The Finite Element Method in Engineering, Fifth Edition

By Singiresu S. Rao Ph.D. Case Western Reserve University Cleveland OH

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The Finite Element Method in Engineering, Fifth Edition, provides a complete introduction to finite element methods with applications to solid mechanics, fluid mechanics, and heat transfer. Written by bestselling author S.S. Rao, this book provides students with a thorough grounding of the mathematical principles for setting up finite element solutions in civil, mechanical, and aerospace engineering applications. The new edition of this textbook includes examples using modern computer tools such as MatLab, Ansys, Nastran, and Abaqus.

This book discusses a wide range of topics, including discretization of the domain; interpolation models; higher order and isoparametric elements; derivation of element matrices and vectors; assembly of element matrices and vectors and derivation of system equations; numerical solution of finite element equations; basic equations of fluid mechanics; inviscid and irrotational flows; solution of quasi-harmonic equations; and solutions of Helmhotz and Reynolds equations. New to this edition are examples and applications in Matlab, Ansys, and Abaqus; structured problem solving approach in all worked examples; and new discussions throughout, including the direct method of deriving finite element equations, use of strong and weak form formulations, complete treatment of dynamic analysis, and detailed analysis of heat transfer problems. All figures are revised and redrawn for clarity.

This book will benefit professional engineers, practicing engineers learning finite element methods, and students in mechanical, structural, civil, and aerospace engineering.

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More examples and exercises All figures revised and redrawn for clarity

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Editorial Review

Review
Very useful introductory text - developing from first principles to clearly explained practical methods.
The Finite Element Method in Engineering 2nd Edition

From the Publisher
It is vital that the engineer or engineering student fully understands the theory and knowledge that underpins the finite element method before it is possible to utilize it in practice. Professor Rao, who has many years of teaching experience at one of the country's leading centers of technical excellence, explains the topics from first principles, making use of numerous illustrations and examples and breaking the subject into easily absorbed segments which will guide the reader through the material in stages.

From the Back Cover
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
· Improved sample and end-of-chapter problems

Users Review

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