The Finite Element Method in Heat Transfer and Fluid Dynamics, Third Edition (Computational Mechanics and Applied Analysis)

J. N. Reddy, D.K. Gartling

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As Computational Fluid Dynamics (CFD) and Computational Heat Transfer (CHT) evolve and become increasingly important in standard engineering design and analysis practice, users require a solid understanding of mechanics and numerical methods to make optimal use of available software. **The Finite Element Method in Heat Transfer and Fluid Dynamics, Third Edition** illustrates what a user must know to ensure the optimal application of computational procedures—particularly the Finite Element Method (FEM)—to important problems associated with heat conduction, incompressible viscous flows, and convection heat transfer.

This book follows the tradition of the bestselling previous editions, noted for their concise explanation and powerful presentation of useful methodology tailored for use in simulating CFD and CHT. The authors update research developments while retaining the previous editions' key material and popular style in regard to text organization, equation numbering, references, and symbols.

This updated third edition features new or extended coverage of:

• Coupled problems and parallel processing
• Mathematical preliminaries and low-speed compressible flows
• Mode superposition methods and a more detailed account of radiation solution methods
• Variational multi-scale methods (VMM) and least-squares finite element models (LSFEM)
• Application of the finite element method to non-isothermal flows
• Formulation of low-speed, compressible flows

With its presentation of realistic, applied examples of FEM in thermal and fluid design analysis, this proven masterwork is an invaluable tool for mastering basic methodology, competently using existing simulation software, and developing simpler special-purpose computer codes. It remains one of the very best resources for understanding numerical methods used in the study of fluid mechanics and heat transfer phenomena.

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