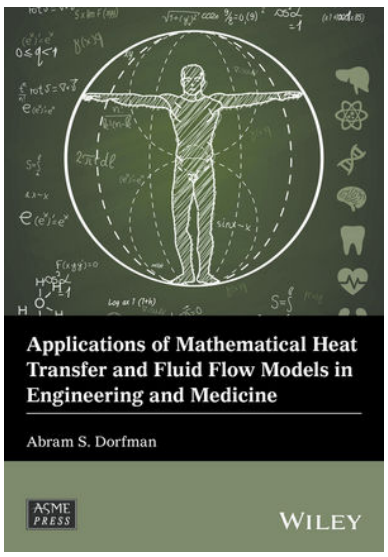

Applications of Mathematical Heat Transfer and Fluid Flow Models in Engineering and Medicine

Abram S. Dorfman

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DESCRIPTION

Applications of mathematical heat transfer and fluid flow models in engineering and medicine

Abram S. Dorfman, University of Michigan, USA

Engineering and medical applications of cutting-edge heat and flow models

This book presents innovative efficient methods in fluid flow and heat transfer developed and widely used over the last fifty years. The analysis is focused on mathematical models which are an essential part of any research effort as they demonstrate the validity of the results obtained.

The universality of mathematics allows consideration of engineering and biological problems from one point of view using similar models. In this book, the current situation of applications of modern mathematical models is outlined in three parts. Part I offers in depth coverage of the applications of contemporary conjugate heat transfer models in various industrial and technological processes, from aerospace and nuclear reactors to drying and food processing. In Part II the theory and application of two recently developed models in fluid flow are considered: the similar conjugate model for simulation of biological systems, including flows in human organs, and applications of the latest developments in turbulence simulation by direct solution of Navier-Stokes equations, including flows

around aircraft. Part III proposes fundamentals of laminar and turbulent flows and applied mathematics methods. The discussion is complimented by 365 examples selected from a list of 448 cited papers, 239 exercises and 136 commentaries.

Key features:

• Peristaltic flows in normal and pathologic human organs.

• Modeling flows around aircraft at high Reynolds numbers.

• Special mathematical exercises allow the reader to complete expressions derivation following directions from the text.

• Procedure for preliminary choice between conjugate and common simple methods for particular problem solutions.

• Criterions of conjugation, definition of semi-conjugate solutions.

This book is an ideal reference for graduate and post-graduate students and engineers.

ABOUT THE AUTHOR

Abram S. Dorfman, Doctor of Science, Ph. D. was born in 1923 in Kiev. He was a leading scientist in fluid mechanic and heat transfer at the Institute of Thermophiysics of the Ukrainian Academy of Science and associate editor of *Promyshlennaya Teploteknika* translated by Wiley as *Applied Thermal Science.* He earned his Ph.D. with a thesis *Investigation of Supersonic Flows in Nozzles* and received a Doctor of Science degree with a thesis and a book *Heat Transfer in Flows around the Nonisothermal bodies*. He emigrated to the United States in 1990 and continues his research as a visiting professor at the University of Michigan. During that time, he published several articles in leading American journals and two books . Dr. Dorfman has been an adviser to Ph. D. students and has published more than 140 papers and four books. More than 50 of his papers published in Russian have been translated into English.

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