

Engineering Research Council for supporting the work described in this two-part paper.

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## Computational Fluid Mechanics and Heat Transfer

D. A. Anderson, J. C. Tannehill and R. H. Pletcher

The book was written in a textbook format based on course notes used in an advance level and graduate course at Iowa State University. In an introductory section a brief review of the physical significance and the mathematical behaviour of the most common partial differential equations encountered in fluid mechanics and heat transfer is presented, followed by the introduction of the basic fundamentals of finite difference techniques. These techniques are then applied to obtain the solution of selected model equations (wave, conduction, Laplace and Burgers). The individual characteristics of the various schemes are illustrated and discussed.

The remainder of the book is devoted to specific applications. A detailed discussion of the appropriate differential equations including those associated with turbulent flows, is followed by a detailed study of the numerical solutions of the equations associated with inviscid flow, boundary layer, 'parabolized' Navier Stokes and the complete Navier Stokes equations. The last topic discussed is grid generation.

The treatment of the fundamentals and the application of finite difference techniques in fluid mechanics and heat transfer is well organized and masterfully presented. No generalized programs are presented, but the reader is given all the information he needs to formulate his own program or gain a more complete understanding of an existing algorithm. This book will make a valuable addition to the library of those involved in CFD activities.

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## Natural Convection

S. Kakac, W. Aung and R. Viskanta

Buoyant forces play a very important role in a large number of flows found in our environment and in engineering applications. While we have made considerable progress since 1960 in our understanding of these flows, this information has not been collected and documented in a well organized presentation of the subject. It is also recognized that our knowledge of a number of the phenomena involved is so limited that accurate predictions of the rate of heat transfer and details of the flow can not be made at the present time.

In recognition of the importance of natural convection a NATO Advanced Study Institute was held in 1984 to disseminate current information and highlight areas in which there is a critical need for further study. This book is composed of lectures and papers presented at the Advanced Study Institute.

Specific topics discussed include: external boundary layer flows; plane layers; flows in enclosures and in the presence of a stratified fluid; natural convection in porous media and in melting and solidification; and mixed convection. Specific emphasis is also placed upon turbulence modelling and the influence of temperature dependent properties.

Like many proceeding volumes there is an unevenness in the treatment of some of the topics. Of particular interest are the contributions dealing with turbulence modelling, mixed convection, natural convection in melting and solidification process and the summary article dealing with still unsolved problems in natural convection. The editors are to be congratulated for assembling an extremely useful book for those interested in buoyant driven flows.

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