BOOKS

Heat-Transfer Calculations by Finite Differences, George M. Dusinberre, International Textbook Company, Scranton, Pennsylvania (1961). 293 pages.

Professor Dusinberre has helped to bring to finite-difference methods the same degree of development enjoyed by the analytical and analogue methods. Carslaw and Jaeger's definitive volume is available for analytical solutions, and several good books on analogues have appeared, but no previous work of such completeness exists for arithmetic methods for heat transfer calculations. As a man experienced in all three techniques, the author has made the lessons of his experience available to the practicing engineer.

It is particularly true of finite-difference methods that facility can only come from experience in using them. This book is a guide for gaining that experience most rapidly. The bulk of the book is devoted to real problem applications. The arrangement of these problems is uniform throughout. Each section is labeled, in order, PROBLEM, DISCUSSION, NUMERICAL DATA, and SOLUTION. An average of four or five pages is devoted to each sample problem, which gives an indication of the detail. In most cases two or more alternate solutions are discussed. The examples cover all of the more commonly encountered heat flow situations, transient and steady state in simple and complex geometries, while providing the background for handling others. Two chapters deserve special mention. The first is an infrequently included treatment of transients in flow systems, and the second is a thorough chapter on variable properties.

This reviewer feels that insufficient emphasis is given to the ubiquitous difficulties associated with instability. A five-page chapter deals with methods for minimizing or avoiding the size limitations imposed on time and space intervals by the stability criterion. The topic is worthy of more attention. Oftentimes the success of a solution proceeds from a fortuitous first choice for the form of the equations to be used.

In summary, this useful book should find a place in a field of still growing importance. As the author points out, numerical solutions do not, as is often charged, suffer from a lack of generality. A graph of dimensionless ratios is as general as a differential equation. It is also a fact that even in cases where analytical solutions are possible, finite-difference methods may lead to simpler computation. Any practicing engineer working on complicated heat transfer problems could profit by access to all of the material in this book.

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