this basic principle, the reader may well be inspired to look up some of the other volumes herein cited for a broader view of its practical applications and human implications.

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Newsweek

Heat Conduction

CONDUCTION OF HEAT IN SOLIDS. By Horatio Scott Carslaw and J. C. Jaeger. 420 pp. Oxford University Press, New York City, 1947. $8.00.

HEAT CONDUCTION. By Leonard Rose Ingersoll, Otto J. Zobel, and Alfred C. Ingersoll. McGraw-Hill Book Company, New York City, 1948. $4.00.

The subject of heat conduction is apt to be overlooked in the contemporary emphasis on atomic physics, and books on it bulk small in comparison with the field's basic importance and interest. Irrespective of questions of heat flow arising in innumerable physical experiments and engineering projects, the study of heat conduction is valuable as perhaps the simplest and most vivid introduction to the boundary value problems of mathematical physics. It was, in fact, the investigation of heat conduction in a taurus which led Fourier to the discovery of his celebrated series. It is thus often profitable to center an introductory course in the partial differential equations of mathematical physics around the subject of heat conduction. In recent years these books, two of the leading texts in the field, have been out of print, and their reappearance in improved and enlarged form is most welcome.

The two volumes differ in emphasis and approach. The Carslaw and Jaeger book, the more advanced of the two, has the approach of an applied mathematician; the book by Ingersoll and collaborators uses the approach of an experimental physicist. For example, one of the important appendices in the Carslaw and Jaeger treatise is a table of Fourier transforms. Ingersoll and collaborators include instead an appendix tabulating experimental values of heat conductivities and diffusivities. It should not, however, be inferred that physical applications are wanting in the Carslaw book, or that mathematical analysis is lacking in Ingersoll's. The latter uses Fourier series and integrals extensively, and assumes no previous knowledge of these subjects. Carslaw includes many illustrative physical problems, notably, as an innovation, the theory of automatic temperature control. Still the flavor of the two volumes is quite different, and it is for this reason they complement each other so nicely.

The treatise by Carslaw and Jaeger is the successor to Carslaw's "Introduction to the Mathematical Theory of the Conduction of Heat in Solids," which appeared in 1921 and which in turn replaced the second half of the still earlier "Introduction to the Theory of Fourier's Series and Integrals and the Mathematical Theory of the Conduction of Heat," written by Carslaw in 1906. At the end of the preface of the new book, Carslaw adds a personal note that Jaeger has been its principal author. One could only wish that all collaborators were equally generous! The authors appropriately say in the preface, "In the last twenty-five years so many developments have been made, both in the theory and applications of the subject [of heat conduction], that a new book embodying these advances seemed called for rather than a new and revised edition of the old one." One of the most notable changes compared to the 1921 volume is that four chapters have been added which are devoted to the method of Laplace transforms. This material replaces the two chapters on the method of contour integrals in the earlier volume. The two procedures are basically related, but the Laplace one is "much simpler, more direct and powerful." The most outstanding characteristic of the book is the great completeness with which the different boundary value problems are treated, without impairment of lucidity. The physicist or engineer with some specific problem in heat conduction to solve will do well to thumb through the volume to see whether somewhere the proper mathematical analysis is not included.

"The Mathematical Theory of Heat Conduction," published by Ingersoll and Zobel in 1913, has been out of print so long that it is wanting from many libraries, and not so well known as it deserves to be. The new title, "Heat Conduction with Engineering and Geological Applications," is a more descriptive one. The volume has been expanded to almost double its previous size, and Professor Ingersoll's son has been added as the third author. The literature of heat conduction has grown considerably since the original volume, and about three-fourths of the references are to articles subsequent to 1913. Among the new material is a chapter on approximation methods, including graphical procedures and the relaxation method of Southwell. The great strength of the book is in the richness of its physical applications. Instructors employing it as a text can make good use of the numerical problems at the chapter ends on such subjects as the conduction of firebrick walls, hardening of steel, and electric welding. These tend to give the student more physical feeling for the mathematical analyses than if orthogonal functions are presented in a purely abstract way. Discussion of the timely subject of the heat pump is included. Especially interesting are the geophysical applications scattered throughout the volume—such subjects as geysers, the cooling of a lacolith, and attempts to deduce information concerning the history of Wisconsin glaciation from the geothermal curves in the Calumet and Hecla mines. The mathematical theory of heat conduction is indeed a useful tool for the geologist or geophysicist!

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Luminescence

SOME ASPECTS OF THE LUMINESCENCE OF SOLIDS. By F. A. Kröger. 310 pp. Elsevier Publishing Company, Inc., New York City, 1948. $5.50.

This is one of a series of publications reporting scientific work done in Holland during the war. The first part of the book contains a broad theoretical discussion of the phenomena of luminescence in solids, followed by four chapters presenting mainly experimental results on the luminescence of a large number of oxygen-containing phosphors, such as various tungstates, molybdates, titan-