Book Reviews

The New Heat Transfer. By E. F. Adiutori. The Ventuno Press, Cincinnati (1974). 240 pp. $19.95.

Written in an unconventional and sometimes argumentative manner, this book describes different and somewhat unusual approaches to the engineering science of heat transfer. Contending that the traditional concept of a heat transfer coefficient merely adds artificial complexity and confusion, the author proposes treating convective heat transfer by a fundamental equation of the form

$$q = f_1 \text{ (system properties) } f_2 \text{ (thermal driving force)} \quad , \quad (1)$$

where the f's refer to functions in a broad sense. The author further asserts that the concept of dimensional analysis is nonscientific and of little value and suggests correlating heat transfer data in the form of Eq. (1) without resorting to using dimensionless groups. The book, which consists of nine chapters, is almost entirely devoted to the consideration of convective heat transfer problems. Also included are discussions and illustrative examples on the thermal stability of heat transfer processes, pool boiling curves for both ordinary liquids and liquid metals, the application of the author's generic criterion for thermal stability to the design and analysis of thermal equipment, and his own personal views of heat transport processes.

In general, the book appears to contain many controversial and, at times, perplexing statements. Little effort, however, is actually needed to grasp the gist of the book. For example, the drawback of the concept of the heat transfer coefficient (which mathematically assumes a linear relationship between heat flux, q, and temperature difference, ΔT) when applied to highly nonlinear convective heat transfer processes, can be readily understood. On the other hand, the reader is likely to find it difficult to concur with some of the author's reasoning, opinions, and propositions. His arguments for the ultimate rejection of Fourier's law, the Stefan-Boltzmann law, the concept of resistance, and dimensional analysis appear extremely debatable. For the reader accustomed to the concept of heat transfer coefficients, some of the illustrated problems also appear unrealistic.

One obvious weakness of the book is that it neither presents theoretical substantiation for Eq. (1) nor discusses in detail the functions f_1 and f_2 contained therein for different convective heat transfer processes. Presentation of the new approach is thus largely superficial. Crucial questions such as what should be the basis for choosing the parameters when carrying out complex heat transfer experiments, how can a large number of empirical correlations obtained in the form of Eq. (1) be put in a compact and convenient form without utilizing dimensionless groups, and what should take the place of the heat transfer coefficient in a systematic treatment of heat transfer theory, are virtually overlooked. Generally speaking, little proof of the feasibility and practicality of the proposed methods is given. Furthermore, equations or numerical results obtained by the traditional means are sometimes used to illustrate the proposed approach, thus causing confusion and doubt.

In conclusion, it can be said that some of the points brought up in this book may have merit. However, any possible value of the book tends to be lost by highly controversial statements and questionable reasoning.

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About the Reviewer: C. J. Hsu is presently a chemical engineer in the Department of Applied Science at Brookhaven National Laboratory. Dr. Hsu has been at Brookhaven since 1962 and has conducted theoretical researches in the field of fluid dynamics and liquid-metal heat transfer. He also served as adjunct professor of mechanical engineering at the Cooper Union for the Advancement of Science and Art in New York City. His current work at Brookhaven involves thermal and hydraulic safety analysis for boiling water reactors and pressurized water reactors using computer codes. He holds graduate degrees from Columbia University and the University of Houston and is the author or coauthor of about thirty technical papers.

Activation Analysis with Neutron Generators. By S. S. Nargolwalla and E. P. Przybylowicz. Wiley-Interscience Publishers, Inc., New York (1973). 662 pp. $29.50.

This treatise is Volume 39 in the Wiley-Interscience series of monographs on Chemical Analysis edited by P. J. Elving and I. M. Kolthoff. At the outset of this review of the book, before getting into any detailed comments, this reviewer would like to remark that the book represents a capable and thorough treatment of a fairly specialized subject—neutron activation analysis (NAA) carried out with small deuteron accelerators that generate fast neutrons.

The book consists of seven chapters, ranging in length from 23 to 351 pages (except for the short 8-page introductory chapter), plus four appendices that total 33 pages, and an index. The main six chapters cover the subjects, respectively, in succession of (Chap. 2) Production and Interaction of Fast Neutrons, (Chap. 3) The Neutron Generator, (Chap. 4) Radiation Hazards and Shielding Considerations for Neutron Generator Facilities, (Chap. 5) Preparation and Transportation of Samples, (Chap. 6) Sources and Reduction of Systematic Error, and (Chap. 7)