BOOK REVIEWS

Selection of books for review is based on the editors' opinions regarding possible reader interest and on the availability of the book to the editors. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

A REVIEW BY FIELD TEST

Title Neutron Physics

Authors K. H. Beckurts and K. Wirtz

Publisher Springer-Verlag New York Inc.

Pages X + 444

Price $17.00

Reviewer Robert E. Uhrig

This book, which is a completely revised edition of *Elementare Neutronenphysik* published by the authors in German in 1958, is a welcome addition to the English language literature for those teaching and carrying out research in the neutron physics field. The translation to English was ably carried out by L. Dressner.

The book is divided into four parts: Part I—Production and Nuclear Interaction of Neutrons; Part II—The Theory of Neutron Fields; Part III—The Determination of Flux in Spectrum and Neutron Fields; Part IV—The Determination of Neutron Transport Parameters.

The volume deals heavily with experimental techniques; indeed, it reflects the background and interest of the authors. There are a number of subjects covered that, to this reviewer's knowledge, appear in organized form in the generally available literature for the first time.

Particularly impressive are the organization and scope of coverage of parts III and IV. Specifically, the authors have adequately covered the measurement of energy distribution of the neutrons using both differential and integral methods, and the use of threshold detectors for fast neutrons and standardization techniques for neutron measurements. The authors have an excellent coverage of the measurement of the slowing-down parameters and the measurement in thermal-neutron fields by pulsed source methods, but their coverage of the production and measurement of modulated neutron fields (neutron waves) is very limited and out-of-date.

Neutron Physics was used at the University of Florida during the Fall Trimester, 1965, as the textbook for a seminar by the students and staff members of the Department of Nuclear Engineering. This seminar, which met three times weekly, covered parts I, III, and IV, which constitute approximately 65 percent of this text. Part II, dealing with the Theory of Neutron Fields, was not covered in the seminar because it is covered in other courses at the University of Florida.

The general reaction of both students and professors was that this book is so packed with information on so many neutron physics topics that many of the details, which would make this book more valuable as a teaching text, have been omitted. Both students and professors complained about the intermediate steps that were omitted in many of the developments and the large amount of work that was required to fill in the intermediate steps in certain cases. Furthermore, the inclusion of problems would have been very helpful. All agreed that the book served very well as a reference. There was general praise for the organization and length of the list of special references appearing at the end of each chapter, particularly since this aided in obtaining additional information on topics covered.

On balance, this reviewer believes that this book constitutes a significant contribution to the reactor physics field, and it will undoubtedly be used widely as a reference book by graduate students and experimentalists at both national laboratories and universities. It is well written, and its broad scope is one of its strong points and, perhaps, its principal weakness. It can, and undoubtedly will be, used as a textbook in graduate courses in Nuclear Engineering, but it will require considerable supplementation and expansion to cover vigorously the subject matter.

Robert E. Uhrig is Chairman of the Department of Nuclear Engineering, University of Florida, where since 1960 he has taught and done research. At Iowa State University he taught nuclear engineering and theoretical and applied mechanics, and supervised the University's reactor and a nuclear engineering group at the University's Institute for Atomic Research. For four years he instructed in the Department of Mechanics

at the US Military Academy. Author of some 30 technical papers on reactor kinetics, reactor noise, neutron wave propagation, and nuclear engineering education and Editor of Noise Analysis in Nuclear Systems, *he received the 1962 ASEE (Southeastern Section) Award for the best technical paper. He holds several important posts in the ANS and in other professional societies. His BS degree in mechanical engineering was received with honors from the University of Illinois in 1948; his MS and PhD degrees in theoretical and applied mechanics were received from Iowa State University in 1950 and 1954.*

AN EXCELLENT STARTING POINT

Title Thermal Stress Techniques in the Nuclear Industry

Authors The Franklin Institute Research Laboratories; Z. Zudans, T. C. Yen, W. H. Steigelmann

Publisher American Elsevier Publishing Co., Inc. (1965)

Pages XXII + 583

Price $20.00

Reviewer Raymond J. Parsick

The authors rightly use the word "techniques" in the title of their book. It is an excellent summary of technical methods and tools for determining temperature distributions in components and resulting stresses. From several fields, the authors have assembled basic theories pertinent to thermal stress problems, and they present the digested material with admirable lucidity. Numerical examples amply illustrate applications of the theories. In addition, a considerable amount of quantitative information pertinent to specific problems is scattered throughout the book.

The authors begin with a rather superficial, but adequate, description of nuclear power plants, which is apparently intended for those not involved in reactor design.

Chapter 2 deals with determination of temperature distributions. Of necessity, emphasis is on techniques rather than published solutions by other authors. Some generalized solutions for temperature distributions in simple geometries is presented in this chapter, mostly in graphical form. Unfortunately, the graphs cause considerable eyestrain and numerical information is often difficult to extract. Fortunately, titles for many graphs contain a reference to their source, although the referenced source is not always the best place to obtain information. For example, the authors present some charts for central temperature change in semi-infinite bodies subjected to a step or ramp change in surface temperature. The references in the figure titles would send the reader to Carlson and Jaeger, *Conduction of Heat in Solids*, or to Schneider, *Conduction Heat Transfer*, excellent books for many purposes. However, National Bureau of Standards Monograph 2 presents the same information in 19 pages of tables which permit easy determination of not only temperature but also thermal stress distributions. Therefore, this chapter lacks clear quantitative information about known solutions for simple geometries but excels in presenting the approach and tools for more difficult problems.

With a similar emphasis, Chapters 3 and 4 deal with the techniques for determining elastic and plastic stresses and Chapters 5 and 6 discuss applications to plant components. The authors have done more than compile proven techniques for analyzing creep, thermal fatigue, axisymmetrical structures, and design considerations of reactor components. They have also added original material to fill several gaps in the literature. They provide procedures for analyzing arbitrarily shaped rings, axisymmetric redundant structures, and plates connected by elastic elements supported on an elastic foundation.

As a consequence of the emphasis on techniques, an engineer looking for a ready answer to a simple problem will have difficulty finding it in this book. However, an engineer entering the nuclear field who faces a new problem in thermal stress analysis will find this book an excellent starting point for the problem's solution.

Raymond J. Parsick worked at Bettis Atomic Power Laboratory on the thermal, hydraulic, and mechanical design of the nuclear reactors for the aircraft carrier Enterprise and the cruiser Longbeach, from conceptual design through the sea trials. Since 1962 he has worked at Brookhaven National Laboratory on the development of the Settled Bed Fast Reactor concept. His BS is from Carnegie Institute of Technology.

PURSUED BY OBSOLESCENCE

Title Beryllium - Its Metallurgy and Properties

Editor Henry H. Hausner

Publisher University of California Press, 1965

Pages 322

Price $9.00

Reviewer Norman P. Pinto

The development of beryllium technology proceeds at a relatively rapid rate, and broad surveys are periodically welcome to both user and producer. This volume provides a review of products and properties capably presented by contributors active in the field. Chapters on extraction and metallurgical fundamentals are generally reviews of prior work, but material on sheet rolling, forging, and casting is new and useful. Important data on product uniformity and reliability are presented and signal beryllium's coming of age.