to analyze reactor kinetic measurements. It presents clear descriptions of the measurements themselves—along with many extremely pertinent observations about possible sources of error, both theoretical and experimental. In many cases the theoretical analysis relating to the measurements is carried out only to the first order, and the theoretical tools for a more thorough approach are not developed. This omission (which, of course, may be intentional) makes the book somewhat incomplete. Nevertheless, I recommend it as a most valuable adjunct in dealing with practical kinetics problems.

Allan F. Henry received his BS in Chemistry from Yale University in 1945. He returned to Yale and obtained an MA in Physics in 1947 and a PhD in 1950 with a theoretical thesis in the area of microwave spectroscopy. In 1950 he joined the Westinghouse Bettis Atomic Power Laboratory and worked on the design of the Nautilus core with particular emphasis in the field on reactor kinetics. He is at present in charge of the Reactor Theory and Methods Group in the analysis and development department at Bettis.

A VALUABLE TEXT

Title Experimental Reactor Analysis and Radiation Measurements

Author Donald D. Glower

Publisher McGraw-Hill Book Company, 1965

Pages xiii + 348

Price $13.50

Reviewer T. G. Williamson

It is a pleasure to find a new book that includes almost everything one has been teaching in a course and find it presented clearly and in enough detail to make a valuable text. *Experimental Reactor Analysis and Radiation Measurements* by Donald D. Glower is just such a book.

The author has written a laboratory text that includes some 60 experiments in the areas of basic radiation measurements, subcritical assemblies, pulsed-neutron-source experiments, shielding, radiation effects, nuclear reactors, and reactor kinetics. The experiments range in complexity and degree of sophistication from introductory experiments on detection elements to more advanced techniques such as measurement of reactor conversion ratio and reactor noise analysis. Each experiment is presented in a format similar to that which a student report might be expected to follow, i.e., a) purpose, b) introduction and theory, c) experimental apparatus, d) procedure, e) analysis of results, and f) topics for discussion. About half of the experiments can be done in an afternoon lab with equipment ordinarily present at a research reactor facility, critical laboratory, or in a laboratory with only a subcritical assembly and a pulsed source. Some of the rest of the experiments require more specialized equipment or are of such nature as to lead to longer term projects or even graduate theses.

The experimental procedures are written in general terms in such a manner that they can be applied at each facility. As the experiments progress to the more sophisticated, the procedures become more general, leaving most of the experiment to the design of the students. Each experiment includes a section on topics for discussion, which includes several thought-provoking questions which could lead to valuable class discussions or become a large part of the student reports.

The author makes good use of references. In nearly all experiments he refers to a standard text or to a primary source in a readily available journal. At the end of the second chapter there is a bibliography with 57 entries, relative to the contents of the previous chapter. However, one wonders why such bibliographies do not appear at the end of the other chapters.

One can always be critical of a book if it doesn't meet all preconceived ideas of what its content should be. For example, I would like to have seen more shielding experiments (various source geometries, albedo measurements, slant incidence, etc.), more than one paragraph devoted to measuring the fast fission factor, and a little more emphasis on the concept of dollars and cents as units of measured reactivity. However, these are minor points and should not be allowed to detract from the overall excellence of the book.

In his preface the author states that the book is not for use in a training laboratory in which radiation counting skills are taught, and in the text he doesn't place great emphasis on instrumentation or simple counting techniques. Rather, he makes liberal references to other books in this field, particularly *Nuclear Radiation Detection* by Price. He further states that ". . . particular care has been taken to include basic experiments which require academic proficiency at the M.S. and Ph.D. student level." He has successfully attained the goal, in my opinion, of producing a graduate-level text book. The book is a valuable addition to the library of the reactor experimentalist. Students and teachers will find many good experiments and procedures; the researcher will find it a good reference for experimental techniques with which he is not intimately associated.

Thomas G. Williamson received his BS from the Virginia Military Institute, his MS from Rensselaer Polytechnic Institute, and his PhD from the University of Virginia, all in physics. He has worked at Alco Products as a nuclear engineer and has been on the faculty at the University of Virginia where he is presently Associate Professor of Nuclear Engineering.

A REVIEW AND A HALF

Title Ceramics for Advanced Technologies

Editors John E. Hove and William C. Riley

Publisher John Wiley & Sons, 1965

Pages ix plus 448 (including a 26-page index)

Price $19.00

Reviewer A. Boltax

The editors of this book have assembled material that was the outgrowth of a UCLA Engineering Extension Division short course entitled "Ceramics for Aerospace Technology." The lectures and additional material are presented in two books, *Ceramics for Advanced Technologies* (reviewed here) and *Modern Ceramics: Some Principles and Concepts.* The editors acknowledge a small amount of overlapping among the subjects presented in the two books.

Ceramics for Advanced Technologies can be discussed by dividing the contents into two parts. The first part treats various classes of ceramic materials (oxides, graphite, intermetallics, glass, and selected refractory composites) and emphasizes the relationship between microstructure, fabrication techniques, and properties. The second part examines applications of these materials to some of the more advanced technologies such as re-entry, rocket nozzles, nuclear reactors, energy conversion systems, and space environment effects. In general, the material in both sections is introductory in nature and would be useful to students or engineers interested in a broad prospectus of the field of ceramics and advanced applications. The book, prepared by 13 authors, is well written and can be read quite rapidly, since it does not penetrate the subject matter in great detail. Although much of the information presented is relatively current (to 1964), the rapid growth of information in related fields will soon outdate the book. One particularly attractive feature of the book is an excellent index which should be useful to the non-ceramics-oriented individual who is faced with the prospect of learning the language of ceramics.

For the materials engineer interested in expanding his knowledge of ceramics, and the sophisticated design engineer, this reviewer recommends the other book, *Modern Ceramics: Some Principles and Concepts,* prepared by the same editors and publisher. This book has the same good features of the first book and has considerably greater technical content. *Modern Ceramics:* etc. does not cover ceramic applications, but its treatment of basic phenomena, fabrication, test techniques, and properties is presented in a highly competent and interesting manner. It also is backed up by fairly extensive references which would aid more detailed studies.

Alvin Boltax is Manager of Fuel Development at Westinghouse Astronuclear Laboratory where for the past five years he has been involved in the development of graphite-matrix fuel elements for nuclear rocket applications. Prior to joining Westinghouse, he was Group Leader and Project Manager at Nuclear Metals, Inc., where his work involved fabrication and development of metallic fuel elements and basic research on radiation damage and precipitation-hardening alloys. He received his BS and ScD degrees from the Massachusetts Institute of Technology in physical metallurgy in 1951 and 1955.

EXCELLENT AND USEFUL

Title Boiling Heat Transfer and Two-Phase Flow

Author L. S. Tong

Publisher John Wiley & Sons, Inc., 1965

Pages xiii + 242

Price $14.00

Reviewer P. Griffith

This book does two things of value for the person working on the hydraulic design of water-cooled nuclear reactors. It looks into the physics of the processes of boiling, void formation, burnout, and pressure drop, and collects the currently-used equations for computing these quantities. The value of this book to a reactor designer is enhanced by the up-to-date bibliography. Though there are equations which can be used for fluids other than water, the bulk of the data and most of the equations are only appropriate for water at elevated pressures. Except for hydraulic stability, all the questions a reactor designer is likely to ask about hydraulic design are answered in this book in some form.

One question which almost every designer using the book will have to face is: Which of the several ways given to compute something is best? In general, more than one way is given with only broad guidance as to when each method is to be used. This makes use of the book difficult. If this is a criticism, it is more of a criticism of the field than the book, however, as most of the authors of correlations do not clearly state the limitations of them, nor do they compare their results with anyone else's.

In summary, this is a useful book of current interest to the designer of water-cooled nuclear reactors and an excellent introduction for someone just entering the field.

Peter Griffith is Associate Professor of Mechanical Engineering at Massachusetts Institute of Technology where he has worked, written, and lectured on boiling and two-phase flow for the past fourteen years. In addition to his work at MIT, he has conducted research in the field at Argonne and Bettis and for Thompson-Ramo-Woolridge, and lectured at the Institutt for Atomenergi, Norway. His BSME (1950) is from New York University, MSME (1952) from the University of Michigan, and his ScD (1956) from MIT.

SHOW ME — AND THEY DID

Title Remote Handling of Mobile Nuclear Systems

Authors D. C. Layman and G. Thornton