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.

Advances in Nuclear Science and Technology Volume 6, 1972

Editors	Ernest J. Henley and Jeffery Lewins
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Reviewer	G. B. Melese-d'Hospital

This volume is the sixth of a series devoted to bringing to the engineering and scientific community a review of progress made in the entire nuclear field. The usual problem with such an approach is that it is never completely satisfactory since the one book cannot possibly please both the specialist and the generalist. On the other hand, a more even coverage of the various topics included, or closer relationships between the chapters of a given volume, would probably lead to a bigger audience than does the too diversified and uneven treatment in the present case.

In this volume, three articles are rather specialized and three are of a very general nature. They cover such different fields as applied mathematics, solid or fluid mechanics, heat transfer, fuel cycle, and the ship propulsion reactor. Furthermore, the treatment goes all the way from very esoteric, to scholarly, to very descriptive. It is therefore rather difficult to see who would like to have this book in his library, unless he wants to buy it only for the one article of interest to him. A description of the content of this volume will help to clarify this point.

The first chapter is an interesting story by German authors on the design, experiments, and experience with the core of the reactor of the first European nuclear merchant ship, *Otto Hahn*. Good operational experience was obtained with the first core, and a second advanced core has been installed. Although the 10 000-shp reactor for this ore carrier is rather small, it is believed that powers from 50 000 to 100 000 shp could lead to competitive nuclear ships.

The second chapter, by a Finnish mathematician, is concerned with stability analysis of nonlinear point-reactor kinetics. The reviewer must confess that this highly mathematical article is not light reading and will probably appeal only to a very small number of specialists.

In the third chapter, J. R. Matthews discusses the very important problem of deformation and stresses in fast-reactor fuel pins. The description and evaluation of existing codes will be very useful to the nonspecialist confused by code proliferation in this area. An updating of this chapter to concentrate on fuel-pin models now used for design and interpretation of experiments would certainly be very desirable.

The article on the gas centrifuge, by Donald Olander from Berkeley, provides a convenient summary of the theory of the countercurrent centrifuge. In view of the increasing worldwide interest in this method of fuel enrichment, such a good review of various theories for flow hydrodynamics should be of interest to a number of people. The conclusions showing the incentive for obtaining the highest possible centrifuge peripheral speed are particularly useful.

The next chapter by Professor Sesonske on heat transfer in Liquid Metal Fast Breeder Reactors (LMFBRs) is rather disappointing because it will satisfy neither the casual reader (too many details in such areas as hot channel factors) nor the engineer directly involved in sodium-cooled reactor development, because of the superficial and often out-of-date treatment of a number of items; for example, the heat-transfer reference for fuel assembly design is dated 1964. While the field of heat transfer in LMFBRs is still in rapid evolution, excellent references were available in 1968 (ASME Symposium), or in 1971 (ANS New Orleans Conference). Extensive accomplishments in core or components heat-transfer design in recent years have been overlooked, thus significantly reducing the overall value of this chapter.

Finally, in the last article two Dutch authors treat the impact of fuel cycle economics on the future development of nuclear power. This ambitious enterprise in reactor strategy is nevertheless limited to the case of Western Europe up to 2010. The fondness of the authors for the Liquid Fuel Breeder (i.e., a thermal reactor using molten salt or aqueous suspension, with the ^{233}U-^{232}Th cycle) leads them to rather controversial conclusions about the best mix of reactors. Instead of heavy-water reactors and liquid-fuel reactors, it is more probable that nuclear power in Europe by the end of this century will consist in

a mixture of light-water reactors, high-temperature gas-cooled reactors, and fast breeder reactors. Yet the authors are to be commended for their parametric study of a number of selected nuclear programs and for their interesting sensitivity analysis, in spite of the fact that their conclusions may not be of universal value.

In summary, while the reviewer believes that this series on nuclear science and technology should be continued and could serve a useful purpose in providing authoritative reviews of advances in various nuclear fields, the present volume will probably not completely satisfy any of the engineers or scientists who may want to buy it, although they will probably want to consult this book in their library.

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