Book Reviews

Space-Time Nuclear Reactor Kinetics. By Weston M. Stacey, Jr. Academic Press, Inc., New York (1969). 186 pp. $13.

This attractive little monograph is devoted to recent theoretical developments in space-dependent reactor dynamics. It is really a collection of brief review articles, and it serves its stated purpose as a bridge "between the older texts on reactor kinetics and the new work appearing in the current technical literature."

The main objection is that the book is too brief. Each topic is introduced at a rather high level of sophistication. Nobody will mistake this book for a text; it is written for well-indoctrinated specialists.

Several of the chapters end abruptly. The author has taken the reader across a bridge and dropped him there. What next? Have we arrived at the frontier, or has the author lost interest? This is not idle wishing for the "graceful exit" of literary style. Some readers will miss the perspectives that might have been provided in closing some of the chapters, especially the chapters on variational synthesis, stochastic kinetics, and control.

Some well chosen numerical results are presented. Many other examples have been published in journals; some of these are cited in the references. The book would be better able to stand alone if more numerical examples had been reproduced (with appropriate commentaries). A larger bibliography would have been helpful, and a more comprehensive subject index should have been prepared.

For the record, the authors of Ref. 3 (pp. 3 and 149) are A. Z. Akcasu, G. S. Lellouche, and L. M. Shotkin.

With reference to p. 11: it would be proper to quote Al Henry's observation that natural modes occur in clusters of seven. It is, however, a bit of a leap to assert, without commentary, analogous properties for the eigenvalues of the finite-difference formulation represented by Eq. (1.12).

The quasistatic method of Ott and Meneley shows great promise. It deserves more than the passing reference on p. 32.

Section 2.7 is devoted to the alternating-direction implicit method. Attention should be called to the alternating-direction explicit method (Ref. 11 of Chap. 2). The latter is more straightforward and probably more efficient. As a result of Denning's work, its importance is beginning to be realized in this country.

The variational method has a strong appeal, but its virtues should not be exaggerated. The impression is given on p. 63 that there is no restriction upon the weighting functions. In fact, the weighting functions are adjoint to the expansion functions. If one wants both sets of functions to be arbitrary, then one has to forego the existence of a variational principle (a small price to pay in most practical problems).

Figure 5.1 is not a phase plane, as asserted on p. 125. It is a two-dimensional parameter space.

Computer jargon like "edit region XX" should have been stamped out by the manuscript editor. It can possibly be forgiven in the figures (Chap. 5) but not in the text (p. 133).

There is a confusing point on p. 144. The Region R "within which the linear analysis is valid" is not the same region R in which V exists (p. 142). This reader fell into a trap, and he hastily composed several indignant (and superfluous) paragraphs about what the Liapunov method can and cannot do for linear systems. Let authors and critics both be more punctilious.

If there are more words of criticism than praise in this review, it is because critical comments are easier to write. Actually, it was a pleasure to read this book. The author writes well, and he has made a valuable contribution to the literature of reactor dynamics.

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About the reviewer: David Hetrick is professor of nuclear engineering at the University of Arizona in Tucson. His current interests in teaching and research are reactor dynamics, nuclear safety, laser optics, and thermodynamics. He received his PhD in theoretical physics at UCLA in 1954. He was a reactor physicist at Atomics International for nine years, and has taught physics at Rensselaer Polytechnic Institute and San Fernando Valley State College. His textbook Dynamics of Nuclear Reactors *was published by the University of Chicago Press in 1971, and he edited the proceedings of the most recent Arizona symposium on reactor dynamics (*Dynamics of Nuclear Systems, *University of Arizona Press, 1972). Professor Hetrick assisted in the formation of the new Arizona Section of ANS.*

Mathematical Methods in Nuclear Reactor Dynamics. By Ziya Akcasu, Gerald Lellouche, and Louis Shotkin. Academic Press, Inc., New York (1971). 460 pp. $22.

The authors state in the preface to this book that they ". . . have tried not to duplicate the subject matter and approach of existing texts . . . ." The reviewer feels that the authors have taken this objective as a serious goal and as a result have produced a text which is rather orthogonal to other texts in this field. A potential pitfall in adopting such a philosophy is that the least significant aspects of the subject may be emphasized at the expense of more significant material. This reviewer believes that the authors have occasionally fallen into this trap. Of more concern, they