mendable coherence and completeness is achieved in this book.

The book is written clearly and graphically and should be a valuable reference to radiation scholars and workers. It remains, however, a scholarly work and would require practical design supplements for designers and mission planners. This need is not to its detriment, as other sources and applications of this source should provide these supplements. It is nevertheless a "must" reference work for any activity, academic or applied, having reference to or relevance to the nuclear radiation environment in space.

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Mathematical Methods in Nuclear Reactor Dynamics

Authors	Ziya Akcasu, Gerald S. Lellouche, and Louis M. Shotkin
Publisher	Academic Press Inc.
Pages	460
Price	$22.00
Reviewers	T. F. Parkinson and S. K. Loyalka

The potential customers for this book are, according to the dust cover, ". . . research workers and graduate students in nuclear engineering and . . . engineers who design control systems for nuclear reactors." The book is derived from lectures developed by Professor Akcasu and should serve as a suitable text for a graduate level course in reactor dynamics. A very thorough treatment of dynamics based on the point-reactor model is presented. The textual material in six of the seven chapters is supplemented by problems which enhance the pedagogical value of the book.

The authors first discuss the neutron transport equation and then derive the various model kinetic equations in a consistent and clear fashion. The simple model equations are treated in considerable detail and a very lucid presentation of the problems which can be solved exactly is given in Chaps. 1, 2, and 3. Chapter 4 is devoted to approximate solutions of the point kinetic equations without feedback and again the treatment is clear and easy to follow.

The authors begin with the development of feedback models in Chap. 5, and the final two chapters contain a detailed analysis of linear and nonlinear stability. Various stability criteria are developed and are then used to study the feedback models.

While this book gives a very thorough mathematical treatment of the point reactor kinetics, its usefulness as a text is somewhat limited by the constraints of the point model. A very cursory discussion of the physical aspects of actual reactors is given and no space is devoted to the use of digital or analog computational techniques. No mention is made of the effect of photoneutrons on kinetics, and the topics of space-dependent effects and noise analysis are not covered. Since the usual one semester graduate course in reactor dynamics should cover these topics also, it is likely that this book should be used in conjunction with other works (e.g., recent books by Stacey, Mohler and Shen, Hetrick, Weaver, Ash, Schultz, etc.).

There are a few typographical errors in the book but these did not appear excessive. Very good reference lists with entries as late as 1970 are given at the end of each chapter.

In summary, this book will undoubtedly prove useful as a text in the area of reactor dynamics; it should also serve as a convenient reference for engineers concerned with reactor stability and control.

S. K. Loyalka is an assistant professor of nuclear engineering at the University of Missouri-Columbia. He took his graduate work in nuclear engineering at Stanford University where he received the PhD degree in 1967. Following his graduate studies, he joined the staff at the University of Missouri-Columbia. During the period 1969-1971, Professor Loyalka was a visiting scientist at the Max Planck Institut für Strömungsforschung. He teaches classes in reactor kinetics, transport theory, and mathematical methods in engineering. His research interests are in the areas of reactor analysis and the applications of transport theory to rarefied gases. T. F. Parkinson is professor and chairman of nuclear engineering at the University of Missouri-Columbia. Following graduate work in physics at the University of Virginia, he worked for seven years for E. I. du Pont de Nemours and Company at the Savannah River Laboratory. He taught in the Department of Nuclear Engineering Sciences at the University of Florida from 1960 until 1967 when he joined the staff at the University of Missouri-Columbia. His research and teaching interests are in the areas of reactor physics and neutron spectrometry.

The Fermi Surfaces of Metals

Author	Arthur P. Cracknell
Publisher	Harper & Row (1972)
Pages	283
Price	$11.25
Reviewer	Richard A. Young

The study of the Fermi surface provides one of the most sensitive methods of determining the one-electron energy levels (band structure) of metals. Furthermore, a knowledge of the Fermi surface provides a spring board for a more complete understanding of the thermal, electrical, and magnetic properties of metals. In this monograph Professor Cracknell reviews the present level of our understanding of the Fermi surface in elemental metals.

The book is organized into two parts. In Part I the Fermi surfaces of what the author calls s and p block metals are discussed. These metals consist basically of those elements for which only the outermost s and p orbital valence electrons are important in determining the shape and size of the Fermi surface (e.g., the alkalies). In Part II the author discusses the d and f block metals (e.g., the noble and transition metals) which are characterized by the fact that the electrons in the d and f orbitals of the neutral atom strongly influence the shape and size of the Fermi surface.

For each metal the experimental and theoretical Fermi surface studies, up to 1970, are presented and briefly discussed. References are not limited to one experimental technique but include all direct (e.g., de Haas-van Alphen effect) and indirect (e.g., magnetoresistance studies) methods of studying the Fermi surface in metals. Each part ends with a short summary of where the gaps exist in our knowledge of Fermi surfaces.

In the Introduction the author asks forgiveness if this monograph seems to read like a stamp catalog. I forgive him, but it still reads like a stamp catalog. All of the figures have been transcribed verbatim from the literature so the reader must also face the frustration induced by a lack of uniform notation (what is the k_x axis on p. 54 becomes the k_a axis on p. 56, etc.).

This book is just the publication under separate cover of two review articles which appeared in *Advances in Physics*. If your library subscribes to this journal there is really no need to have this book. For those libraries which do not have this journal the book would provide a good bibliography of what is known about the Fermi surfaces of the elements up to 1970.

Richard A. Young was born in 1942 in Pittsburgh, Pennsylvania. He received his BS from Lehigh University in 1964. For graduate training, he worked with Professor Leopoldo Falicov at the University of Chicago on the subject of transport theory in metals and received his PhD in physics in 1968. He came to the University of Arizona in 1968 as a research associate and since 1970 has been an assistant professor of physics. In 1971 he was awarded the Alfred P. Sloan Research Fellowship which is given annually to a handful of young, promising scientists.