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Book Reviews

Digital Computers and Nuclear Reactor Calculations. By WARD C. SANGREN. Wiley, New York, 1960. 208 pp., $8.50.

High-speed digital computers have been extensively used for the past decade in reactor design and application. Thus a book addressed to the reactor uses of computers would appear to be a logical and useful work. However, the field covers a broad range of technologies, starting with the physics and engineering representations of reactor phenomena and their representation by mathematical equations, the reduction of these equations to forms which can be solved on a digital computer, the development of techniques for achieving such solutions economically, and finally, the process of preparing a program which will enable a given digital computer to perform the required calculations. It is a difficult task to cover adequately this broad range of topics in a short book.

Dr. Sangren's book generally takes an intermediate approach which would not satisfy or be particularly useful to people with experience in the field, but which is probably, at least in parts, too difficult for casual observers or people working in the more elementary parts of the problem. This difficulty for the inexperienced may also arise from the occurrence of technical terms with special meaning which are not always defined in the text.

I suspect the major use of this book will be to provide a quick background for a beginning nuclear engineer or scientist to orient him to the uses of the digital computer in his proposed field, and to guide him to areas which he might wish to pursue more thoroughly by reference to the current technical literature or other text books.

The first half of the book deals with an introduction to reactor problems, the fundamental characteristics of digital computers themselves, programming, and numerical analysis. The second half of the book deals with actual examples of reactor calculations, covering such topics as fission product poisoning, diffusion and age-diffusion calculations, transport equation and Monte Carlo calculations, kinetics, depletion, shielding, and engineering calculations. The pace of the book is somewhat uneven in its demands on the reader's knowledge, passing from simple explanations of readily understandable matters, to rather complicated equations and derivations within the same section.

A further source of annoyance to the inexperienced reader is the rather general evidence of poor proof reading in the book. There are numerous obvious mistakes in the equations and inconsistencies in the notations. If the reader is aware of this, the book has the virtue of pulling together in a few pages a description of the significant techniques and problems involved in the use of digital computers for reactor design and analysis.

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[Editor's Note: Mr. Parker has been associated with the nation's atomic energy program since 1942 when he joined the staff of the Chicago Metallurgical Laboratories, part of the war-time Manhattan Project. He has directed Radiological Sciences activities at the Hanford Atomic Products Operation since 1944. Currently, as Manager of General Electric's Hanford Laboratories, he is responsible for the conduct of the extensive nuclear research and development program of the Hanford plant.]

Nuclear Radiation Engineering, An Introduction. By F. W. HUTCHINSON.

This book does not define the field of nuclear radiation engineering. Apparently the intended topic is the application of radiation sources, particularly artificial radioisotopes to the various industrial processes. Curiously enough the text indicates the actual engineering areas involved in nuclear reactor engineering. Nuclear radiation engineering, it states, involves a knowledge of atomic and nuclear causes of radioactivity, the kinds of radioactivity, the energy release associated with disintegration, and the effects of radiation. Why these are not equally significant in nuclear reactor engineering is not made clear.

The book addresses itself to an audience of administrators and engineers "at the rim of the atomic circle." It also aims at lowering the industrial language barrier between the executive and the atomic scientists which "causes concern on the part of the executive when he is required to make a decision based on advice or evidence which he does not fully understand. . . ."! The result is a peculiar mixture of background data intended to be palatable to an engineering-oriented audience.

It is divided into four parts. Part I is an introduction to atomic and nuclear structure. Some of this is done with great success as in the account of the identification of cathode rays as electrons. Other portions are less successful, as when equations incompatible with the elementary nature of the text are introduced. Acceptability of the format is nullified by the request to accept as axiomatic Einstein's equation for the energy equivalence of mass. If the nuclear radiation engineer needs scientific background in his field,