made concerning standards and programmed instruction.

In the previous volume, a discussion was given of multiprogramming. The final articles deal with multiple computer systems and is a dual to the article on multiprogramming. A multiple computer is not easily defined out certainly implies the use of multiple arithmetic elements and multiple memory units, and probably multiple input-output devices. One section deals with a system-design approach for a hypothetical multiple computer. A later section discusses four existing multiple computer systems. Comments are given on general programming considerations and multiple computer scheduling. The multiple computer art is just well-started and undoubtedly there will be considerable advances during the next few years.

Ward Sangren

Computer Applications Incorporated
San Diego, California

About the Reviewer: Ward Sangren is a vice-president of Computer Applications Incorporated. He is the author of a book on digital computers and nuclear reactor calculations. From 1956 to 1961 he was at General Atomic. Prior to that he was at Curtiss-Wright and at the Mathematics Panel of Oak Ridge National Laboratory, and was for two years an assistant professor of mathematics at Miami University.

Theory and Method of Nuclear Reactor Calculations. Edited by G. I. Marchuk. Authorized Translation from the Russian by Consultants Bureau, New York (1964). 199 pp. $40.00.

This book is a collection of papers by many authors, describing original work done prior to 1962, and frequently citing Second Geneva Conference articles. Thus, the book closely resembles a back issue of a nuclear science journal—an issue worth reading by those who follow the literature in transport theory, resonance absorption, and neutron cross sections. These three topics account for twelve papers in the collection; another six deal with miscellaneous topics in reactor calculation methods.

Among the six papers devoted to transport theory, two concern the properties and application of even-order P_N approximations—a topic which has only recently come under investigation in the United States. The extensive treatment (35 pp) includes numerical examples of problems for which the even-order solutions are superior to the odd, owing to an improvement in the accuracy of the fundamental relaxation length. Additionally, these papers comprise an application of the Russian difference-equation factorization method discussed by Marchuk in his textbook on reactor calculations[1].

Three papers deal with a particular transport problem, namely the distribution of neutrons from a point source. In the first of these, the problem of singularities in the space-angle distribution from an isotropic point source is treated by a modification of the S_N technique; in the second, by application of the P_N expansions. The third of these papers is a numerical example of the inversion of the moments method to produce space-energy distributions in infinite hydrogeneous media.

The sixth transport-theory paper deals primarily with the internationally vexatious problem of the slow rate of convergence of the S_N equations. The techniques of renormalization, extrapolation and over-relaxation as applied to the S_N equations, are shown to significantly accelerate pointwise convergence.

The set of three fundamental papers on resonance absorption are concerned, as the recent United States effort has been, with improving the treatment of deviations from the basic narrow-resonance formulae. In a paper concerned with direct numerical solution of the Boltzmann equation for homogeneous media, the departure of the collision density from the narrow-resonance shape is computed—a technique which should be much more conservative of machine time, for comparable accuracy, than the corresponding brute force attack taken in the United States.

The three papers on fast-neutron cross sections include an extensive (16 pp.) discussion of the application of statistics to nuclear physics measurements, optical-model transport cross-section calculations, and some results of inelastic scattering cross sections for iron.

The translation from the Russian has produced a quite readable text, with two minor exceptions. In many places, the term "kinetic equation" appears in place of "transport equation." Thus, the paper "Solution of the Kinetic Equations by the S_N Method" is only a teaser to the reader interested in space-dependent kinetics. Secondly, the names of some American authors have been transliterated rather than translated; however, references to J. Chernik and N. Korngold will probably not bother American readers (except, possibly, J. Chernick and N. Corngold). The only serious defect of the

[1] G. I. MARCHUK, *Numerical Methods for Nuclear Reactor Calculations*, Translated from Russian by Consultants Bureau, New York, (1959). Reviewed in *Nucl. Sci. Eng.*, **12**, 317 (1962).

translation is its belated appearance—this is most serious for the even-order P_N approximation and the resonance absorption papers.

The lack of communication between Western and Russian authors is equally apparent from a perusal of the literature citations in *Nucl. Sci. Eng.* and the present collection of papers. Since the scientific community is demonstrably capable of producing elegant communication devices for other users, the scriptural injunction, "Physician, heal thyself" seems uncomfortably appropriate.

John E. Suich

E. I. du Pont de Nemours
Savannah River Laboratory
Aiken, South Carolina

About the Reviewer: John E. Suich is a Research Physicist in the Theoretical Physics Division of E. I. du Pont's Savannah River Laboratory, where he is concerned with the development of numerical methods for the solution of reactor physics problems. Prior to joining Du Pont, he was, for two years, a Junior Research Collaborator with the Theoretical Reactor Physics Group at Brookhaven National Laboratory. He received his B.A. degree in Physics from Harvard University, and his Ph.D. in Nuclear Engineering from the Massachusetts Institute of Technology.

Nuclear Power Plants: Design, Operating Experience and Economics. By Robert L. Loftness. D. Van Nostrand Co. 548 pages. $12.50.

After a couple of chapters on basic problems in nuclear engineering and nuclear materials for the non-specialists, this book presents eight chapters on the most important types of power reactors being considered both in the U. S. and abroad. An excellent chapter on aerospace reactors is followed by a chapter on economics of nuclear power. For each major type of reactor, a description of the main existing reactors follows a few pages on design considerations and trends.

The author must be commended for the book's thorough coverage of reactors, especially foreign reactors which are seldom sufficiently described in the American literature. Design data, plant description including actual pictures and cutaways, and operating experience when applicable, are presented for most reactors. A large number of references is given for each type of reactor and a very useful ten-page "Index for Nuclear Reactor Code Names" is presented.

Having been asked to review Mr. Loftness' book at my return from the 1964 Geneva Conference—thought to be too commercial by some people—it is difficult for me to agree with the somewhat pessimistic views expressed in Nuclear Power Plants on the economics of nuclear power. A nuclear reactor may not be such an 'off the shelf' item as a recent price list might let us believe, but, at the end of 1964, the question seems to be which type of nuclear reactor is the most competitive for a power plant, rather than whether nuclear power is competitive with conventional power.

It may be unfair to judge a book in a fast-moving field on prediction rather than on the facts presented. It is obvious that late developments, such as application of large nuclear reactors to desalinization or new concepts like fast gas-cooled reactors, could not have been included in a book which was published in 1964, but probably written in 1962. But important developments such as coated particles for high temperature gas-cooled reactor fuels are not even mentioned, and not enough emphasis is placed on prestressed concrete vessels for gas cooling.

Some inconsistencies may be found in the book because of the use of different references for the same reactor. For instance, the Peach Bottom reactor is said to produce 28.5 MW (electrical) page 512, while the correct figure of 40 MW may be found two pages later in a different table. Also, on page 436, a 19-rod bundle is mentioned for EBOR, in spite of the fact that it was only an early design.

But the author has well succeeded in writing a book useful for "the engineer, the executive and the student" although he has had to compromise to satisfy their different needs. This book, which is presented in a very attractive fashion, will serve as a useful reference for executives or students, although not as a textbook. The book makes very pleasant reading, and is a useful quick source of information on nuclear power plants.

Gilbert Melese

General Atomic
P. O. Box 608
San Diego, California 92112

About the Reviewer: After a degree of Aeronautical Engineer from Paris, Gilbert Melese obtained a Ph.D. in Fluid Mechanics from Johns Hopkins University in 1954.

From 1954 to 1957 Dr. Melese was at Saclay in charge of the thermal design of the French CO_2-cooled reactors G2, EDF1, EDF2 and EL4. After three years at Columbia University teaching Nuclear Engineering, he joined General Atomic in 1960. Since then, he has been taking part in the design of several types of advanced high-temperature gas-cooled power reactors.