

used as a text for an advanced course in Strength of Materials or a course in Plane Problems in Elasticity.

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85[S, X].—G. BIRKHOFF & E. P. WIGNER, Editors, *Proceedings of Symposia in Applied Mathematics, vol. XI, Nuclear Reactor Theory*, American Mathematical Society, Providence, R.I., 1961, v + 339 p.

This book contains the nineteen papers presented at the Symposium on Nuclear Reactor Theory jointly sponsored by the American Mathematical Society and the Office of Naval Research which was held in New York City, April 23–25, 1959. The expressed purpose of the present volume is to increase the number of mathematicians who will devote “serious effort to the mathematical problems of nuclear reactor theory,” by indicating a variety of mathematical problems encountered in this field. There is a considerable diversity in the content and approach taken in the various papers, ranging from papers oriented towards the physical aspects of the problems to those of a purely mathematical nature.

The volume begins with an excellent paper entitled “Reactor Types” by A. M. Weinberg, which furnishes a background for the symposium. As is pointed out there, despite the diversity of neutron chain reactor types, “In every case neutrons induce the basic energy-liberating fission reaction, and they are themselves produced by the fission reaction. It is this property that gives to nuclear reactors their name—‘chain reactors’—and to the mathematical theory of nuclear chain reactors a beautiful unity.” The general chain reactor equation is set up in terms of the neutron flux as a function of the basic variables of position, energy, velocity direction, and time. In this paper problems associated with the treatment of the general equation are discussed, and various simplifying assumptions appropriate for the several types of reactors are outlined.

E. P. Wigner surveys some of the more interesting mathematical problems of nuclear reactor theory. Papers treating particular mathematical problems associated with the reactor equations and processes include: G. Birkhoff, on “Positivity and Criticality”; G. J. Habetler and M. A. Martino, on “Existence Theorems and Spectral Theory for the Multigroup Diffusion Model”; and a paper by G. M. Wing on spectral theory problems associated with transport theory.

The problem of the deep penetration of radiation, which is important in reactor shielding problems, is discussed in a paper by U. Fano and M. J. Berger.

J. E. Wilkins, Jr. derives the diffusion approximation to the transport equation.

A set of papers on numerical methods includes: R. Ehrlich, concerning one-dimensional multigroup diffusion calculations; R. S. Varga, on solving the multi-dimensional, multigroup diffusion equations; R. D. Richtmyer, concerning the application of Monte Carlo methods; B. Carlson, concerning the solution of the neutron transport equation; and R. Bellman and R. Kalaba, on the application of invariant imbedding to the solution of some one-dimensional problems of neutron multiplication.

The treatment of two problems associated with the determination of the energy

dependence of neutron flux is discussed in a paper on neutron thermalization by M. S. Nelkin and in one on resonance absorption by L. W. Nordheim.

Papers treating problems associated with time-dependent behavior of reactors include: H. Soodak, surveying some of the problems of reactor kinetics; H. L. Garabedian, on low-power core kinetics; H. Brooks and also T. A. Welkin, on the stability of reactors at higher powers.

From the range of subjects and the list of authors given above, it can be seen that in this symposium volume a broad range of problems of nuclear reactor theory has been surveyed by a well chosen set of authors.

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86[W, Z].—ROBERT S. HOLLITCH & BENJAMIN MITTMAN, *Computer Applications—1961*, The Macmillan Company, New York, vii + 198 p., 23 cm. Price \$8.95.

This book contains the proceedings of the 1961 Computer Applications Symposium sponsored by the Armour Research Foundation. On the whole, the papers on business and management applications deal primarily with the adoption of standard automatic data processing procedures and computational techniques. For example, one speaker decried the fact that extensive research was being carried out in the fields of indexing and literature searching rather than in the area of management control for carrying out routine library operations such as catalog preparation. Papers on engineering and scientific applications include the following fields: real-time control in space flight, communications engineering, medical diagnosis, and teaching machines.

The papers dealing with automatic programming for numerically controlled tools, the implementation of ALGOL in Europe, and the use of decision tables in problem definitions provide an informative description of the current status of important types of problem-oriented programming languages.

This small volume contains the following presented papers plus transcripts of the discussions:

“Management of Records in a Large-Scale Collaborative Research Program (Honeywell 800)” by Bernard H. Kroll.

“A Method for Systematic Documentation—Key to Improved Data Processing Analysis” by Orren Y. Evans.

“Automation of Library Operations” by Louis A. Schultheiss.

“Man-Machine Communications in the Coming Technological Society” by Simon Ramo.

“The Coming Impact of Computers on Advertising” by Edward F. Andresen.

“Computer Techniques in Assembly Line Balancing (IBM 1620, IBM 650, UNIVAC Solid State 80)” by David I. Scheraga.

“BUWEPS PERT-Milestone System—A Tool for Management” by Yukio Nakayama.

“Description of the Mercury Real Time Computing System” by James Donegan.

“The Progress of ALGOL in Europe” by Peter Naur.