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.

"Scientific Applications for the UNIVAC LARC" by Cecil E. Leith, Jr.

"Digital Computers in Communications Engineering" by Robert M. Fano.

"Automatic Programming for Numerically Controlled Tools—APT III" by Edgar A. Bates.

"Medical Diagnosis Aided by Digital Computers" by Robert S. Ledley.

"CLASS—The Automated Classroom (Philco 2000)" by Donald E. Englund and D. P. Estavan.

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87[X].—WOLFGANG HAHN, *Theory and Applications of Liapunov's Direct Method*, 1963, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, x + 182 p., 23.5 cm. Price $9.00.

Take a differential equation

$$\dot{x} = X(x, t) \tag{1}$$

where x and X are n - vectors (vectors with n components), $X(0, t) = 0$ for $t \geqq 0$, and X satisfies standard conditions, continuity included, to guarantee existence and uniqueness of solutions in a certain spherical region $S : \|x\| < A$. How stable are the solutions relative to the "trivial" solution $x = 0$? The problem of stability thus faced is of great theoretical and practical importance. It has given rise to a widely developed theory whose creator is the great Russian mathematician Liapunov (around 1890). Owing in part to the language barrier (in spite of a French translation in 1907), this theory lay practically forgotten by the world at large. It woke up very suddenly about 40 years ago and has been vigorously pursued in the USSR since then. In recent years it has at last reached these shores, with the result that many younger scientists in the U.S. are now participating in its development.

The present volume, a translation of the 1959 German edition of the Ergebnisse series, is a most valuable and timely addition to the literature in English on the subject. It is part careful treatise, part summary of many contributions, for a large part from the Soviet Union, the leader in this field. Definitions and theorems are carefully stated and proved, making this monograph a very good guide in the subject, particularly in view of its ample bibliography. The following chapter titles will give an idea of the extensive ground covered:

1. Fundamental concepts.
2. Sufficient conditions for stability or instability of equilibrium.
3. Application of the stability theorems to concrete problems.
4. The converse of the main theorems.
5. Liapunov functions with certain properties of rate of change.
6. The sensitivity of the stability behavior to perturbations.
7. Critical points.
8. Generalizations of the concept of stability.

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