entiation, and the solution of ordinary differential equations. The part on partial differential equations is a bit brief but does convey much information that is needed by the engineer.

All in all, it is a fine text for engineers.

R. W. HAMMING

Bell Telephone Laboratories
Murray Hill, New Jersey

86[P, Z].—JOHN PESCHON, Editor, *Disciplines and Techniques of Systems Control*, Blaisdell Publishing Company, New York, 1965, xi + 547 pp., 24 cm. Price $12.50.

This is an excellent collection of articles by different authors devoted to an exposition of a number of recent developments in the field of control theory. The list of chapter headings gives a quick idea of the contents: L. Pun and J. Peschon, "The State of the Art of Automatic Control"; E. W. Henry, "The Basic Mathematics of Automatic Control"; J. Peschon, "Multivariable and Timeshared Systems"; L. G. Shaw, "Optimum Stochastic Control"; J. Peschon and H. B. Smets, "Nonlinear Control Systems: Selected Topics"; A. M. Letov, "Liapunov's Theory of Stability of Motion"; A. A. Feldbaum, "Optimal Systems"; C. L. McClure, "Reference Stabilization and Inertial Guidance Systems"; J. Peschon, L. Pun, and S. K. Mitter, "Computer Process Control"; and R. C. Amara, "Systems Engineering: Its Principles, Practices, and Prospects".

The inclusion of the articles by Letov and Feldbaum make the volume of particular importance. Not only are these authors outstanding in their domains, but, in addition, they are able to give the American reader an overall view of both American and Russian work in these new areas.

The book is highly recommended for students and teachers, and, in general, for all those who want to understand what some of the problems and achievements of modern control theory are.

RICHARD BELLMAN

The RAND Corporation
Santa Monica, California

87[P, Z].—J. WOLFOWITZ, *Coding Theorems of Information Theory*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1962, 125 pp., 23.5 cm. Price $9.35.

In this monograph the author proves 21 coding theorems, 16 strong converses, and eight weak converses for different kinds of channels.

There are 10 chapters: one on the discrete memory-less channel, with particular treatment of the binary symmetric channel and the finite-state channel with state calculable by both sender and receiver or only by the sender; another chapter on compound channels (classes of channels) including channels with feedback; two chapters on finite- and infinite-memory channels; one on the semicontinuous memory-less channel; and one on continuous channels with additive Gaussian noise.

Since its publication the monograph has had a considerable and positive influence on mathematical work on coding theory. Many of its results are due in part to, or have been refined by, the author. The proofs are clear and elegant.

Though the book is perhaps somewhat too dogmatic in judging, for instance, upon the relative merit of weak and strong converses, and though it is hardly an "Ergebnisbericht"—lacking an index and having only a one-page bibliography—it does well achieve the purpose stated in its preface, "to provide, for mathematicians of some maturity, an easy introduction to the ideas and principal known theorems of a certain body of coding theory."

VOLKER STRASSEN

Institut für Mathematische Statistik und Wirtschaftsmathematik
Universität Göttingen
Göttingen, Germany

EDITORIAL NOTE: This book has also been published by Springer-Verlag, Berlin in 1962 as v. 31 of the new series of *Ergebnisse der Mathematik und ihrer Grenzgebiete*.

88[S, X].—H. C. BAKHVALOV, ET AL., *Chislennye metody reshenii͡a differentsial 'nykh i integral'nykh uravnehiĭ i kradraturnye formuly*, (*Numerical Methods for the Solution of Differential and Integral Equations and Quadrature Formulas*), supplement to *Zhurnal vychislitel'noi matematiki i matematicheskoi fiziki* (*Journal of Computational Mathematics and Mathematical Physics*), No. 4, v. 4, Academy of Science, U.S.S.R., Moscow, 1964, 351 pp., 26 cm. Price 1 ruble 55 kopecks (paperback).

There are altogether 28 papers in this collection, of lengths varying from four pages to 59 pages, and covering a wide range of topics. The longest paper is the first, by Bahvalov, on Monte Carlo methods. Other topics include probabilistic error estimates in the solution of differential equations, methods of quadrature for the solution of singular integral equations, difference methods in regions of instability of systems of linear differential equations, several papers on differential-difference equations, asymptotic solution of integro-differential equations, nonlinear boundary-value problems, and a group of papers on special applications in the study of waves, diffraction, and other topics. An overall evaluation would be difficult, but it should be a useful collection for specialists.

A. S. H.

89[X].—EDWIN F. BECKENBACH, Editor, *Applied Combinatorial Mathematics*, John Wiley & Sons, Inc., New York, 1964, xxi + 608 pp., 24 cm. Price $13.50.

This book is an outgrowth of a Statewide Lecture Series on Applied Combinatorial Mathematics offered by the University of California in the spring of 1962. In it are collected eighteen expository articles which are applied, combinatorial, and mathematical in varying degrees and proportions and which together cover a wide range of subjects. Thoughtfully written and handsomely presented, accompanied with diagrams and extensive up-to-date bibliographies, the articles form a valuable addition to the literature. For many readers they will serve as enjoyable introductions to certain fields of lively current interest; for others they will call attention to problems not yet solved. Since most readers will be especially interested in particular articles, we list here the titles and authors:

1. The Machine Tools of Combinatorics, by Derrick H. Lehmer.
2. Techniques for Simplifying Logical Networks, by Montgomery Phister, Jr.