tion"; "Line and surface integrals"; "Differential equations"; and "Trigonometric series."

Bermant writes in the foreword that the aim is to provide a complete course in mathematical analysis for students of applied science and technology. In this he succeeds admirably. All important properties and theorems (and a large number at that) are carefully explained. Of special advantage for the student is the incorporation of a large number of examples, all of them worked out in detail. The concise and lucid manner in which this book is written should make it a very useful textbook. Many topics seldom found in a work of this scope are discussed. The following example is only one of many that could be cited: In the last chapter, "Trigonometric series," there is not only the usual routine treatment and examples for Fourier series but also discussion of the standpoint of mean convergence, Parseval's theorem, Krylov's method to improve convergence of Fourier series, and the like.

F. OBERHETTINGER
Department of Mathematics, Oregon State University, Corvallis

The Social Sciences

Social Science Research on Latin America. Report and papers of a seminar. Charles Wagley, Ed. Columbia University Press, New York, 1964. xiv + 338 pp. $4.

This book is a product of a seminar on the current status of research into Latin American affairs, held at the Center for Advanced Study in the Behavioral Sciences (Stanford, California) in the summer of 1963. It consists of an introduction and seven chapters dealing with the contribution made by the disciplines of geography, history, anthropology, political science, economics, and sociology. With the exception of the chapter on economics, all of the contributions are by North American scholars, and the emphasis is definitely on research done in this country.

There is in the United States a rather long tradition of scholarly interest in Latin American affairs. Great historians like Prescott, Bolton, and Bancroft wrote extensively on different periods of Central and South American history. The anthropologist Robert Redfield did important field work in Central America, mostly among the contemporary Maya, from the late 1920's to the early 1950's, and published works like *The Folk Culture of Yucatan* which are now classics in the field of ethnography. Wagley himself has done research on Latin American communities for many years. The geographer George McBride did important work, primarily on land tenure problems in Mexico and Chile, during the 1920's and the 1930's. Still, it becomes clear from Wagley's book that the field of Latin American studies has been very much neglected by North American scholars and in the universities. Only lately has considerable attention been paid to the field, largely as a result of the unrest created by the revolution in Cuba and the role of the United States in Latin American economic development programs. Anyone who has taught a course in Latin American social structure knows how hard it is to come by reliable and theoretically interpretable information about a large number of areas, ranging from the factual organization and operations of public administration agencies, social mobility, the composition and modes of operation of political parties, the distribution of power and influence among various social groups in the different countries, the factors that influence investment decisions, and so on.

There are, of course, obvious political and practical reasons why we should try to understand in some detail how Latin American societies operate. But Latin America also provides many challenging problems for the theoretically oriented student of social organization. The intricate systems of rank and status, on community and national levels, should be of great interest to the specialist in social stratification. The detailed study of political decision-making and administrative agencies should provide rich material for theories dealing with the sociological factors behind economic growth and stagnation. It would be easy to mention many more examples. There is some danger that North American research on Latin America will become too much policy-oriented, too much concerned with finding answers to pressing practical problems like how to introduce modern technology, how to promote community development, and so on. Such an approach would be self-defeating in the long run.

This book will be a very useful reference work for those who teach and do research on Latin American problems. The various chapters describe how the concern with Latin American matters has developed within the disciplines represented. They also describe much of the most important work that has been done and contain many suggestions for future research required to fill some of the most blatant gaps in our knowledge. There are, however, important items missing from the bibliographies. Thus, the work done in Chiapas, Mexico, by scholars from Harvard and Stanford —Evon Z. Vogt, A. K. Romney, and others—is not mentioned in the chapter on anthropology, and the studies of communities in Guatemala, by Benjamin D. Paul and Melvin Tumin, are not cited. In the chapter on economic research the work of Edmundo Flores, a leading Mexican agricultural economist who has specialized on the land reform question, is not noted.

BO ANDERSON
Stanford University, Stanford, California

Control Theory

Disciplines and Techniques of Systems Control. John Peschon, Ed. Blaisdell (Ginn), New York, 1964. xii + 547 pp. Illus. $12.50.

The theory of systems control has developed considerably during the past decade. Although there is no sharp distinction between the various aspects of control theory, more sophisticated and specialized mathematical techniques are being used; communication has thus become difficult between specialists in otherwise closely related fields. One may distinguish three major branches that stem from control theory: optimization of stochastic systems, nonlinear systems, and optimization of deterministic systems. This division is apparent in *Disciplines and Techniques of System Control*, edited by Peschon. Other areas of research where techniques are highly specialized, such as sampled data systems, or which are only now being investigated, such as learning systems, are not covered in the book.

The first three chapters should be of interest to anyone with a knowledge of linear control theory. The state space and matrix notations, necessary in later chapters, are very clearly introduced. The chapter on multivariable systems covers material that is not generally found in standard textbooks, but is a natural extension of conventional theory.

The next chapter is an island of stochastics. Its chief merit is the discussion of the optimum estimator and optimum stochastic control, but the summary of random processes and optimum filtering seems unnecessarily long.

Nonlinear-system analysis is covered in two chapters. The first is mostly a review of now standard techniques: describing function, phase plane, and optimum switched systems. The second covers Liapunov's theory, and its author, A. M. Letov, states with characteristic Soviet modesty that it is "the single and solid foundation of the modern theory of automatic control." Opinions may differ on that point, but the fact remains that the chapter is prerequisite to the understanding of much of the current Russian research. In addition, it presents two important and recent ideas: the extension of the method to the study of performances and its connection with dynamic programming.

Optimization techniques are dealt with rather summarily in chapter 7, which discusses dynamic programming and the maximum principle. Unfortunately the basic differences (closed-loop versus open-loop) and the numerical problems involved in practical applications are not explored very deeply. Some of this is found in chapter 9, which describes the present capabilities and future possibilities of computer process control. The last chapter is a nonmathematical discussion of large-scale systems engineering.

There is an excellent section on inertial systems, but this has very little connection with the rest of the book. An article on learning systems, for example, would have been far more appropriate.

State-of-the-art books such as this one would be even more useful if the bibliographies were carefully evaluated, as was partly done by L. G. Shaw in his chapter on stochastics. The most serious problems in the field of control are fast becoming those of filtering published research, and of minimizing the time required to keep up to date. This book is a very commendable and, on the whole, successful effort in these directions. It manages to keep mathematical developments to a relatively simple level. Graduate students and research engineers will find it a quite useful frame of reference and guide for further study rather than a self-contained textbook.

MADELINE GOULARD
Aerospace Engineering Sciences, University of Colorado

Photoconductivity

Photoelectric Effects in Semiconductors. Solomon Meerovich Ryvkin. Translated from the Russian edition (Leningrad, 1963) by A. Tybulewicz. Consultants Bureau, New York, 1964. xvi + 402 pp. Illus. $22.50.

Ryvkin's book, *Photoelectric Effects in Semiconductors*, is a welcome addition, both because the number of books on this subject is small indeed and because it gives an authoritative account of the state of the art as reflected primarily in the Russian literature. The coupling between the Russian and the American or European literature is still weak enough to merit a digest of the Russian literature by a Russian author. In this field, Ryvkin is a recognized expert of long standing.

A book on photoconductivity can legitimately claim the major part of modern solid-state physics to be within its province. It follows that any actual book on photoconductivity must be to some extent abortive and, in any event, largely confined to the author's major interests and experience. In the present case the major emphasis is on the intricate variety of recombination processes that make up the lifetimes of free carriers. There are also thorough and helpful discussions of photomagnetoelectric effects, ambipolar drift and diffusion, and P-N junction photocells. The treatment throughout is phenomenological, and the emphasis is generally on semiconductor materials, although, particularly in the chapters on recombination, the behavior of insulating materials is included.

I found the first half of the book, which is concerned with the measurement of photocurrents and their various relaxation processes, somewhat more detailed than necessary. Many of the problems treated are of a highly specialized character that every experimenter expects to resolve as he goes along. Also, in Ryvkin's chapter "Meaning of the concept lifetime," I would have preferred more emphasis on the lifetime of free carriers as the primary parameter determining the sensitivity of photoconductors. The various relaxation processes due to trapping are significant and informative about the density and location of traps, but these processes play a secondary role.

Several major topics that are closely allied to photoconductivity are not included or are given only minor attention in this book. These are space-charge-limited current flow, noise currents, the physics of contacts and of capture processes, and the physics and chemistry of defect states. This is more a measure of the difficulty of writing a comprehensive book on photoconductivity than a criticism of the present volume.

In summary, Ryvkin has given a thorough discussion of a number of major topics in photoconductivity on (approximately) a senior level. Although the book is translated from the Russian language, the English is fluent.

ALBERT ROSE
RCA Laboratories, Princeton, New Jersey

Modern Mathematics

Elementary Concepts of Modern Mathematics. Flora Dinkines. Appleton-Century-Crofts (Meredith), New York, 1964. xii + 457 pp. Illus. $6.50 (pt. 1, 247 pp., $2.45; pt. 2, 132 pp., $1.45; and pt. 3, 107 pp., $1.45).

"Sufficient unto its purpose is the rigor thereof" might well describe this text. And the purpose of the text, as stated by the author in the preface, is to introduce the undergraduate student to some of the topics that have come to be called "modern mathematics." I consider the volume admirably suited for courses in summer institutes where exposure rather than depth is desired. But I forsee considerable difference of opinion as to the place of courses based on this text in the four-year undergraduate program of the mathematics majors. Such a course could not