ones. Each chapter abounds in footnote references, and closes with problems and further bibliography.

The treatment of any particular subject is admittedly cursory in relation to the totality of material on that subject, so much so that some might feel that the book has tried to fill too many of the gaps in the book material that is available on solid-state physics. However the compromise that is reached still seems to afford the best text on the subject that is available at present.

Biographical Memoirs of Fellows of the Royal Society. Vol. 2, 1956. 345 pp. The Royal Society, London, England, 1956. 30s. *Reviewed by Cecilia Payne-Gaposchkin, Harvard College Observatory.*

The second volume of the new series of Biographical Memoirs contains notices of twenty-two Fellows and Foreign Members of the Royal Society who died during 1955 and 1956.

Each notice is an authoritative account of the man's scientific career, written by a Fellow whose work has been in the same field. The critical appraisals and the excellent bibliographies are especially valuable. The biographers write as friends and colleagues as well as fellow-scientists, and the personal details provide a picture of the man as well as of the fellow scholar. A portrait of each subject further enhances the interest of the articles.

Proceedings of the Electronic Components Symposium (Washington, D. C., May 1956). 240 pp. Engineering Publishers, New York, 1956. Paperbound $5.00. *Reviewed by S. F. Singer, University of Maryland.*

These are the proceedings of a symposium sponsored by various engineering societies and manufacturers' associations and held at the National Bureau of Standards.

Physics research often demands outstanding performance from apparatus, which may have to be subminiaturized, or able to stand very high temperatures, or very high radiation densities. From this point of view, development of suitable components is of concern to planners of experiments. Solid-state physicists also may be interested in the various applications of devices such as thermistor materials having positive temperature coefficients, ferrites for use in microwave circuits, properties of piezoelectric titanates and zirconates, and of various types of glasses. An interesting discussion is given on the use of dispersion measurements for analyzing ceramic components and their representation by means of equivalent circuits.

The effects of nuclear radiations on electronic components are of particular topical interest. Not many numerical data are given and the individual effects are not particularly well explained but caution is indicated for the use of gas tubes in control circuits, or of oil filled capacitors, which may give off gas under radiation. Resistances may change under radiation, semiconductor devices are particularly sensitive. In general, organic materials suffer more damage than inorganic materials. Junction diodes and transistors are more resistant than point contact, silicon offers more resistance than germanium. Some thought must also be given to the fact that materials may become activated and continue to radiate after exposure.

Recent advances are discussed: Corona discharge tubes are useful for regulating Geiger counter and photomultiplier voltages. Electromechanical devices using the properties of ferroelectric and magneto-restrictive ceramics make possible high-voltage ceramic transformer and ceramic filters. Another interesting device is a new type of ferroelectric shift register. Complicated printed circuits are constructed by making the electrodes of capacitors out of a high resistance material.

These are only some of the 43 papers presented.

Applied Analysis. By Cornelius Lanczos. 539 pp. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1956. $9.00. *Reviewed by T. Teichmann, Lockheed Aircraft Corporation.*

The numerical treatment of mathematical problems has assumed tremendous importance in recent years with the advent of high-speed electronic digital computers capable of tackling previously intractable problems. Since these comprise a not insignificant number of the questions of present interest to both pure and applied physicists, it certainly behooves most scientists to acquire some familiarity with the finite approximation methods which underlie numerical procedures. It is unfortunate that many of the excellent books that have been written on these methods are redolent of the musty atmosphere of the surveyor's office or the observatory computing laboratory (where, of course, many of the advances in this science originated), and they therefore do not tend to induce a feeling either of nostalgia or interest in those readers not specifically connected with such activities. Professor Lanczos is therefore to be congratulated in writing a book with a life of its own and in which the physical and mathematical significance of the numerical procedures are given their due place.

This book does not aspire to be a compendium of all possible numerical results, but rather a connected account of what the author chooses to call "parexic" methods, i.e. methods involving the determination of approximate solution of problems. (This is to be distinguished in the author's view from Numerical Analysis which then is more concerned with the approximate nature of the arithmetic processes involved in obtaining an "exact" solution with a finite algorism.)

The main sections are entitled, Algebraic Equations, Matrices and Eigenvalues, Large Scale Linear Systems, Harmonic Analysis, Data Analysis Quadratures, and Power Expansions. Among the features of the exposition are a full description of the "movable strip" method of computation, a discussion of overdetermined and underdetermined sets of equations, the method of spectroscopic eigenvalue analysis, trigonometric smoothing processes, approximate inversion of Laplace transforms,

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trigonometric and polynomial interpolations in the large, quadrature methods, and finally a very detailed and excellent account of the approximate solution of differential equations using the "τ" method. Throughout the book the techniques are illustrated by modest but illuminating examples.

This book can be highly recommended to anyone interested in this subject, and particularly to those many readers who regard numbers as a tool rather than as an end in themselves.

Electronic Computers: Principles and Applications. Edited by T. E. Ivall. 167 pp. (Iliffe, England) Philosophical Library, Inc., New York, 1956. $10.00. *Reviewed by P. J. Davis, National Bureau of Standards.*

A collection of essays written for nonspecialists, and covering such topics as analog and digital circuits, storage systems, auxiliary equipment, general principles of computing, applications of digital computers, computers of the future. Somewhat more technical than the scientific volumes in the widely distributed British "Penguin" series, but not substantially so, and hence, in the opinion of the reviewer, vastly overpriced.

Quantum Chemistry: An Introduction. By Walter Kauzmann. 744 pp. Academic Press Inc., New York, 1957. $12.00. *Reviewed by R. Hobart Ellis, Jr., New York City.*

How to introduce quantum-mechanical thinking to classically trained minds bothers most of the teachers and students who face the problem. This book will help. It will find its own place among the several introductions to the subject that are in use today, and it will supplement them all admirably.

The author uses a clear and simple plan of attack. Starting with the basic mathematics of his subject—operators, complex numbers, vectors—he progresses to a definition of the concepts of quantum mechanics. He states its laws simply, with a minimum of discussion, and then he proceeds to derive from these laws the properties of simple chemical systems. In the last section he treats nonstationary states.

There is a serious and, I think, a successful attempt to establish and follow a principle of separation of difficulties. "It is helpful to learn some of the mathematics in the framework of a more familiar physical problem," writes the author and he proceeds to offer the opportunity in the first 150 pages. In this mathematical introduction he makes no mention of quantum mechanics. Instead he introduces one-, two-, and three-dimensional wave equations in terms of strings, membranes, and waves on a liquid-covered sphere. Degeneracy, perturbation, symmetry, and adiabatic transformations are discussed with considerable care and detail long before the Schrödinger Equation appears.

In the author's opinion quantum mechanics is different from most other scientific disciplines in that it is the *concepts* that offer difficulty rather than the laws.