
Books

An Essay on the Application of Mathematical Analysis to the Theories of Electricity and Magnetism (Limited Facsimile Ed.). By George Green. 72 pp. T. Wheelhouse, Nottingham, England, 1828; Wezäta-Melins, Göteborg, 1958. Available from Stig Ekelöf, Chalmers U. of Technology, Göteborg S, Sweden. \$5.00. *Reviewed by R. Bruce Lindsay, Brown University.*

GEORGE Green's famous essay of 1828 is one of the classics of the history of physics. Published by subscription to the number of less than 100 copies, the original edition is now generally unavailable and the reprint in the N. M. Ferrers edition (1871) of *The Mathematical Papers of the Late George Green* is also rather scarce. Hence all those interested in the history of electricity will welcome the appearance of this facsimile reproduction brought out under the sponsorship of Stig Ekelöf, Professor of Theoretical Electricity at the Chalmers University of Technology in Göteborg, Sweden.

It was in this celebrated work that the all-important potential function was first introduced by name. The student who has encountered Green's theorems and Green's function will find them here set forth in clear and elegant fashion by the self-taught miller of Nottingham, one of the great amateurs in scientific research. It is to be hoped that the appearance of this volume will encourage someone to undertake the preparation of a full-scale work on the life of Green and his place in the history of electricity and magnetism.

Molecular Science and Molecular Engineering. By Arthur R. von Hippel and 22 authors. 446 pp. The Technology Press of MIT & John Wiley & Sons, Inc., New York, 1959. \$18.50. *Reviewed by Rolf Landshoff, Lockheed Missiles and Space Division.*

DURING the summer of 1956 a group of scientists and engineers, experts in many fields, pooled their specialized knowledge in conducting a session on "molecular engineering". Out of that session grew this volume, the third and closing one in a series on modern materials research.

In 25 chapters, of which seven are written by the main author, molecular properties of matter are considered from many angles. After fitting them into the framework of classical and quantum physics they are related to the complex phenomena which take place in nature and in laboratory or technical devices. In designing new devices a demand for materials with pre-

scribed specifications arises and several chapters go into the chemistry of building such new materials to order.

Electromagnetic properties and applications in electronic devices receive the biggest share of the attention. Mechanical properties receive a modest coverage and optical properties are barely mentioned. A short chapter relating to flight, tacked on at the end, is quite inadequate, reflecting the fact that the conference took place in the pre-Sputnik era. It has also the dubious distinction of being the only chapter not using the metric system.

The book contains a wealth of information, familiarizing the reader with the basic ideas necessary to the understanding of the subject as well as presenting many important facts and data. There is an impressive amount of references to original work which should be particularly useful. The publication of this book fills a very definite need.

Electronics of Microwave Tubes. By W. J. Kleen. Translated from German by P. A. Lindsay, A. Reddish, C. R. Russell. 349 pp. Academic Press Inc., New York, 1958. \$9.00. *Reviewed by D. J. E. Ingram, University of Southampton.*

IN his preface Dr. Kleen states that "The range of original contributions in this field has become so great that a need has arisen for a book in which the fundamentals of microwave tubes are presented coherently." It can be said in all fairness that this book satisfactorily answers just such a need, and that the whole treatment is carried out in a very precise and coherent manner. The book is not suitable for a complete newcomer to the field of microwave tubes since it is written for the "reader with the physical and mathematical background of a postgraduate student". Detailed introductory descriptions are thus avoided and a book is produced in which nearly every page should be of interest and use to the engineer or physicist actually concerned with microwave tubes of one kind or another.

The chapter content and general treatment follow a logical development throughout the book. The basic definitions and concepts are first clarified and the second chapter then deals with the mathematical treatment of electron motion in static fields. The various induced currents in the different electrode systems are then considered, and the Llewellyn-Peterson equations are derived. The succeeding chapters deal with power flow between electron streams and radiofrequency fields, which leads to the theory of velocity modulation, first in stationary fields and later by traveling waves. Throughout these sections the mathematical treatment proceeds in a very ordered way, and the physical implications of the various expressions are explained at each stage.

In the later chapters of the book the previously developed theory is applied to particular cases of microwave tubes. For this purpose they are classified under three general headings and the principles of operation