BOOK REVIEWS

AN INTRODUCTION TO PLASMA PHYSICS—by W. B. Thompson Pergamon Press, Second (revised) impression 1964 Pp. viii+274. Price 70s net.

Thanks to controlled thermonuclear experiments, plasma physics came into prominence in the world of science about a decade ago The subject has since been developing so fast and in so many directions that students and research workers entering the field need a sound introduction to start with, so that they do not get lost in trying to keep track of the latest developments In this context the importance of such a book as Prof. Thompson's in elucidating the basic knowledge brought up-to-date cannot be overemphasized.

However, the book, as the author himself points out at the outset, leans —rather heavily, I am afraid, —on the physical phenomena associated with the controlled thermonuclear problem. The author has chosen to omit or to avoid as far as possible a few important aspects of plasma physics, e g , inelastic collision processes, local inhomogeneities, interaction of a plasma and an electron beam, etc. It appears that treatment of these aspects in a more favourable light would have added to the usefulness of the book as a comprehensive introduction.

The introductory chapter of the book is both informative and interesting The only important topic one perhaps finds missing pertains to the plasma in solids

In the chapters that follow, the author deals with the basic properties of the equilibrium plasma, the arc plasma, magnetohydrodynamics, magnetohydrodynamic stability, plasma dynamics and particle motions, and kinetic theory of the plasma.

Almost all the important theoretical approaches for the study of pure plasma dynamics are presented in a precise and lucid manner It is heartening to find that the book, though essentially theoretical in nature, contains results of relevant experiments and also discussions on various technological applications of plasma, for example, in the propulsion of rockets and in the direct conversion of kinetic energy to electricity.

In comparison the chapters on the basic properties of the equilibrium plasma and the arc plasma seem to be somewhat neglected. In particular, basic experiments such as those involving double probes and microwave interferometers are not referred to. There are also a few mistakes and omissions, mentioned below, which, in part, may however, be ascribed to the printer concerned.

Referring to an experiment by Langmuir, it is written (p. 12), "In arc discharges the electron density is 10^{11}-10^{12} cm^{-3} and the plasma frequency $\sim$ 100 Mc/s, ...". For the said electron density the frequency should really be $\sim$ 3,00-

10,000 Mc/s. In fact the density in Langmuir's experment was of the order of 10^{10} cm $^{-3}$ and the frequency $\sim 1{,}000$ Mc/s

Secondly, it is not quite correct to say (see p 15) that the resonant form for E appropriate to a cylindrical cavity of radius a is $E \sim J_0(kr)$, obviously because there may be other resonant forms equally appropriate The form quoted corresponds to a particular type of modes, one of which (TM_{010}) was selected by Adler for his experiment

Finally, $c(cm^{-3})$ in Table 3 1, p 32 should be replaced by $n(cm^{-3})$

The book has, however, a number of interesting Tables (see, for example, Pp 11, 20, 51 and 152) and a useful section on problems and their solutions

The bibliography, though not exhaustive, is presented in a helpful manner

The book may, by and large, be surely recommended to all those interested in the fourth state of matter,- particularly from the point of view of the study of its dynamics

J Basu

SEMICONDUCTOR COUNTERS FOR NUCLEAR RADIATIONS by G Dearnaley and D C Northrop, 1963 E and F N Spon Limited, London 55 Shillings

In recent years semiconductor counters are playing an important role in experimental nuclear physics for the detection of nuclear radiations This is because such counters are not only compact and of simple structure but also possess excellent characteristics In the book under review the authors have first dealt with all the basic principles of nuclear radiation detection as also those of semiconductor physics. They then discussed the problem of application of the latter for the former and the technological aspect Finally they discussed the damages which might be suffered by such counters by the radiations to be detected The book also contains an excellent bibliography on the subject The present volume which is supposed to be the first book in the world on this subject is undoubtedly a very useful one to experimental workers both on nuclear physics and on solid state physics since it is now realised that nuclear radiation can be a powerful tool in the study of semiconductors, just as solid state devices can be useful to nuclear physics

A K.Dutta

CLASSICAL CHARGED PARTICLES—by Rohrlich; published by Addison-Wesley Publishing Company, Inc Massachusetts

It is an excellent text for graduate students. It contains important historical landmarks in the theory of electron. Dirac's λ-limiting process has been written keeping the spirit in tact and showing its importance in future works. Though the name is classical electrons some relevant aspect of quantum electrons have also been discussed. A similar story of electron was written in *Zeit fur Physik*, 1928 but a good text was really wanting giving all attempts. Prof Rohrlich's book fills that want.

T Roy

THE STABILITY OF MOTION—by Chetayev, Published by Pergamon Press, Oxford.

It is an elaboration of Lyapunov's method. The author is bold enough to introduce a chapter on transient motion, a topic which is much less developed compared to the stability of steady motion The book will undoubtedly be helpful to engineers such as aerodynamic, communication or mechanical engineers The book indeed contains some of the problems of the above disciplines

T Roy

TENSOR CALCULUS AND RELATIVITY—by D. F Lawden Publishers Methuen and Co. Ltd , London

The book is a monograph on the subject. Though from a course of lectures the authors has built up the book, it seems difficult to recommend it as a text to graduating students. But that does not mean the book is purposeless People engaged in reasearches in other fields or any one who wants to learn general relativity can quickly get the idea reading this lucidly written book In the opinion of the reviewer the topic of covariant derivative could have been presented more elegantly

T. Roy

THE FUNDAMENTAL PARTICLES—by Clifford E. Swartz. Publishers Addison-Wesley Publishing Company, Inc Massachusetts

The book treats the subject in an easily understandable and phenomenological fashion. The author however has kept an eye on the experimental situation all through. Any one having an elementary knowledge of physics e g , the ideas of conservation, relativity etc., will find the book lucid and instructive. The author has not attempted to give theories like SU(3) or bootstraps though however he has mentioned them taking them with illustrations from *Scientific American* 1964 The book may be used as an introductory course to students of Physics (General).

T Roy

In physics, the word plasma1 designates a fully or partially ionized gas consist-ing of electrons and ions. The term plasma was introduced 80 years ago by Irving Langmuir (1881â€“1957) [1] to describe the charge-neutral part of a gas discharge.Â 2 1 Introduction. The plasma state, as an electrically conductive medium, possesses a number of new properties that distinguish it from neutral gases and liquids. Here, one can think of the ragged shape of a lightning discharge or the magnetically conned plasma in a solar prominence. Preface Introduction 1 Introduction to plasmas 1.1 What is a plasma? 1.2 How are plasmas made? 1.3 What are plasmas used for?Â The science of plasma physics was developed both to provide an understanding of these naturally occurring plasmas and in furtherance of the quest for controlled nuclear fusion. Plasma science has now been used in a number of other practical applications, such as the etching of advanced semiconductor chips and the development of compact x-ray lasers. Cambridge Core - Astrophysics - Introduction to Plasma Physics.Â Bessho, N. and Bhattacharjee, A. 2005. Collisionless Reconnection in an Electron-Positron Plasma. Physical Review Letters, Vol. 95, Issue. 24, CrossRef. Google Scholar. Duru, F. Gurnett, D. A. Averkamp, T. F. Kirchner, D. L. Huff, R. L. Persoon, A. M. Plaut, J. J. and Picardi, G. 2006. Magnetically controlled structures in the ionosphere of Mars.