enjoyable. Font Quer's *The Anatomy of Plants* really scarcely belongs to the group, for it is, in fact, part of the section on morphology from a major work; it is well illustrated, and one's only criticism is that the examples chosen seem to include many plants that are common in Spain but unfamiliar in Britain.

These four books, though probably breaking no new ground in the paper-back field (except by offering a non-paper-back edition as well) are sufficiently distinctive to be recommended for a library as a group; with a special recommendation for Couderc and Viaud. G. R. NOAKES

PLASMA PHYSICS

Plasma Physics

By S. Chandrasekhar. Pp. 217. (Chicago: University of Chicago Press; London: Cambridge University Press, 1960.) 14*s*. net.

DURING the past few years there has been growing interest in the dynamics of fully ionized gases, much of it stimulated by the hope of releasing energy by the controlled thermonuclear fusion of light elements. Although the classified research in this field was released at the Second Geneva Conference on the Peaceful Uses of Atomic Energy, there is a serious shortage of comprehensive reviews of recent developments, which this collection of Prof. Chandrasekhar's lectures will do much to alleviate. The lecture course was chiefly concerned with the most interesting approach to plasma dynamics—one that lies between a detailed consideration of individual particle orbits, a method which is usable in only the simplest geometries, and the crude but widely applied magnetohydrodynamic method in which the plasma is represented as an electrically conducting fluid. The method is valid for a diffuse plasma in a strong magnetic field and is based on the assumption that the Larmor radius of a typical particle orbit is much smaller than any other length in the problem, and the corresponding gyrofrequency is much greater than any other frequency, including the molecular collision frequency. It is then possible to use a perturbation treatment of particle orbits and make use of a number of adiabatic invariants to simplify the self-consistency problem for the macroscopic fields.

Chandrasekhar's lectures begin with a brief review of the Maxwell–Lorentz theory of the interaction of an assembly of charges with an electromagnetic field, then proceed to a discussion of the orbits of charged particles in slowly varying fields, introducing and considering rather carefully the significance of the adiabatic invariants of the motion. The first-order orbit theory is then applied to a number of problems, including the equilibrium and stability of plasma in a magnetic field, and the propagation of low-frequency oscillations. There is a brief chapter on plasma oscillations, and a final section in which the possibility of intermolecular collisions is admitted and certain transport processes considered.

The subject is necessarily mathematical in character; but formalism is not allowed to get out of hand. There is no mention of experiment, a particularly unfortunate circumstance in a subject as full of surprises as the physics of ionized gases. The preface confesses that Prof. Chandrasekhar has not read the material, and it is not clear that he would have published it in its present form; however, although not the authoritative monograph for which one might have hoped, this work will be welcome to everyone interested in plasmas, and it should be read by anyone studying theoretical aspects of the subject. W. B. THOMPSON

THERMAL STRESSES

Theory of Thermal Stresses

By Prof. Bruno A. Boley and Prof. Jerome H. Weiner. Pp. xvi+586. (New York: John Wiley and Sons, Inc.; London: John Wiley and Sons, Ltd., 1960.) 15.50 dollars; 124*s*.

THE authors give a comprehensive survey of methods of calculating stresses and deformations in a solid body due to temperature variations. Elastic, visco-elastic, and plastic materials are considered under static, quasi-static, and dynamic conditions, and sections are included dealing with thermodynamic fundamentals and heat conduction.

The book is divided into four parts, of which the first is concerned with basic thermodynamics, and derives the stress-strain and heat-flow equations. For most practical problems, the terms in the heat-flow equations, representing convertibility of mechanical and thermal energy, may be neglected, so that the calculations of temperature distribution, and of stress and displacement distribution, may be made separately. Most of the problems treated in later sections of the book are of this type. The remainder of the section considers various ways of formulating the thermoelastic problem in 2 and 3 dimensions.

The second part is devoted to the solution of the Fourier heat conduction equation for various boundary conditions. Methods described include the superposition and imaging of sources and sinks and the use of Green's functions, characteristic function solutions, the use of Laplace transforms, conformal mapping, approximate solutions using finite differences, electrical analogues, the variational methods of Kantorovich and Green, and Biot's method, obtaining the equations in Lagrangian form. Static solutions may be extended to cover dynamic cases using Duhamel's theorem.

The third and largest section of the book deals with the determination of stress and displacement for a given temperature distribution for various structural elements. Curved and straight beams, trusses, rings, cylinders, plates, reinforced sheet, and shear-lag problems are dealt with mainly by using the approximations of strength of materials theory, St. Venant's principle being invoked in the treatment of end effects. Exact and approximate theories are compared for the case of the rectangular beam. Semi-inverse methods are used for most of the exact solutions described, energy methods being used to obtain approximate solutions. Other methods described are Goodier's method, the use of centres of dilatation, stress functions, and finite difference and influence coefficient methods. Thermally induced vibrations of plates and beams are briefly considered and there is a chapter on stability.

The fourth part, dealing with inelastic systems, serves as an introduction to a rapidly developing