reviews

Air waves

R. Hide

Waves in the Atmosphere: Atmospheric Intra-Sound and Gravity Waves —Their Generation and Propagation. By Earl E. Gossard and William H. Hooke. Pp. xv+456. (Developments in Atmospheric Science, volume 2.) (Elsevier Scientific: Amsterdam, Oxford and New York, 1975.) $64.95; Dfl 156.00. *Atmospheric Waves.* By Tom Beer. Pp. xvi+300. (Adam Hilger: London, October, 1974.) £16.00. *The Upper Atmosphere in Motion: A Selection of Papers, with Annotation.* (Geophysical Monograph No. 18.) By C. O. Hines and Colleagues. Pp. xii+1,072. (American Geophysical Union: Washington, DC, 1974.) n.p.

WAVES of various kinds are present in the atmosphere and the study of their generation, propagation and interaction is of great importance to meteorologists and aeronomers. Compressibility and buoyancy effects due to the action of gravity on vertical density gradients provide the main restoring forces for waves of comparatively short wavelength, with Coriolis effects increasing in importance with horizontal wavelength and becoming dominant for planetary-scale waves. Hydromagnetic effects due to the presence of the Earth's magnetic field complicate wave propagation in the electrically-conducting ionosphere.

Numerous observations of atmospheric waves are now available, thanks to the introduction of a variety of new techniques, including radar and acoustic echo sounders. The first of the three books listed above is an excellent systematic account of mesoscale and small-scale waves dominated by compressibility and buoyancy. It starts with an historical survey and particularly lucid discussions of the basic equations of fluid dynamics and of various theoretical concepts required in the study of wave propagation. Some boundary value problems arising in the analysis of wave-propagation in non-uniform media are then considered. Chapter 6 is largely concerned with various stability problems and the theory of the generation of atmospheric gravity waves, and chapter 7 with the theory of dissipative effects. Observations of gravity waves and infra-sound and considerations of energy sources are presented in chapters 8–10, which include some particularly valuable case studies. Waves in the upper atmosphere are the subject of the eleventh and final chapter. This carefully prepared and well illustrated book can be highly recommended to graduate students and research workers in atmospheric physics.

The book written by Beer cannot, unfortunately, be highly recommended, owing to its many errors and muddled presentation of key ideas and results. This is a great pity because the publishers have gone to a great deal of trouble to produce a handsome and well-illustrated volume, and there is certainly a need for a good treatise on the material covered, which includes treatments of waves on all scales.

Hines' book is altogether different from the other two, and it is by no means clear for whom the book is intended, apart from those specialists who may wish to possess in one volume a collection of excellent papers by one of the pioneers of research on waves in the upper atmosphere and his collaborators, together with a very personal and somewhat idiosyncratic commentary on each paper by the author. In the introduction to the book the author states that " . . . although I have by no means ignored my fellow professionals in making my commentary . . . my thoughts were primarily with the student reader and my design was to provide him or her with a full view of the sort of workings that go on behind the development of a field. Scientific convention normally bars such exposure from orderly textbooks, but this unconventional format provided me with an unusual opportunity—one that normally arises in direct contact with students—and I have not hesitated to exploit it, hopefully for the benefit of students elsewhere". Some future historian of aeronomy will doubtless acknowledge the enterprise of the American Geophysical Union in making this material available, but few science students will have the time to pursue these fascinating byways. □

Nuclear structure

P. E. Hodgson

Nuclear Structure. By William F. Hornyak. Pp. xii+605. (Academic: New York and London, July 1975.) $49.50; £23.75.

THERE are already available several comprehensive accounts of nuclear structure, but this volume is assured of a worthy place by reason of its clarity of exposition, attention to detail and coverage of the most recent advances.

The opening chapter is naturally devoted to the nucleon–nucleon force, and contains a very thorough account of its meson-theoretical basis. It is followed by a summary of our knowledge of the shapes of nuclei and of their electric and magnetic moments. Subsequent chapters are devoted to the various models that enable us to correlate and understand so many features of nuclear structure, starting with the statistical model and the associated topics of the semi-empirical mass formula and infinite nuclear matter. There is a detailed account of the single-particle model, showing how a simple one-body potential is able to account for so many features.

Substantial chapters follow on the individual particle or shell model and on the collective models. That on the shell model contains an account of the coupling schemes and the general symmetry classifications, together with intermediate coupling and the cluster model. The account of collective models covers the classical liquid-drop model, the vibrational states of spherical nuclei and the collective states of deformed nuclei. Two concluding chapters are devoted to the electromagnetic interactions of nuclei and β decay, and there are appendices on angular momentum coupling and on the Wigner–Eckart theorem.

The level of presentation is intend to be that appropriate to a second-year graduate student, but the book will also be found valuable by senior undergraduates and established physicists. □