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Book Reviews

Pedlosky, J., *Geophysical Fluid Dynamics*, 1979. 180 figures, two tables XII, 624 pages. Cloth DM 79.50; US \$ 43.80. Springer, Berlin Heidelberg New York, ISBN 3-540-90368-2.

This book is a thorough introduction to the theory of geophysical fluid dynamics with special applications to large-scale flows in the atmosphere and the oceans. It is based on the method of scaling which is consequently applied to the equations of motion. Physical insight and intuition combines with a vigorous mathematical analysis of the problems.

In the first two chapters basic motions of geophysical fluid dynamics are explained with special reference to the essential influence of the Earth's rotation to large-scale flow. Rossby number, vorticity, thermal wind and geostrophic flow and degeneracy as elementary but fundamental topics are discussed at length in order to elucidate the principal ideas on which geophysical fluid dynamics is founded. A first application of the systematic approximation scheme obtained by scaling is given in Chapt. 3 where the dynamics of a thin rotating layer of homogeneous inviscid fluid is studied. The influence of friction, i.e., of turbulent fluctuations on a large-scale homogeneous fluid is examined in Chapt. 4 by conventional use of Reynolds stresses and in Chapt. 5 by their application to the wind-driven circulation of the ocean. In Chapt. 6 stratification and compressibility are introduced and again systematic approximation by scaling leads to the relevant equations for quasigeostrophic motion of a stratified fluid. Physical intuition is trained by preconceiving qualitative aspects of the motion which is necessary for a proper use of scaling arguments. Chapt. 7 is devoted to instability theory as an essential base for the explanation of growing fluctuations of the flow in the atmosphere and the oceans. Finally Chapt. 8 gives a brief account of the theory of ageostrophic motions, for example of frontogenesis. Graduate students of dynamic oceanography and meteorology will sensibly profit from studying the book because it is really an excellently written text introducing to the basic ideas of geophysical fluid dynamics and to their application to problems of current research. This title should also be available in every geophysical library as an important reference book on geophysical fluid dynamics. **Helmut Wilhelm, Karlsruhe**

Roberts, P.H., Soward, A.M.: *Rotating Fluids in Geophysics*. Academic Press, London, 1978, ISBN 0-12-589650-6

This text evolved from the collected and revised lecture notes of a Summer School for post-graduate students in 1977, held on geophysical problems of rotating fluid dynamics. Applications of the basic concepts of this theory to the atmosphere and the oceans and to the generation of magnetic fields in the stars and planetary cores, but also to laboratory experiments are discussed. In order to give a brief account of the variety of problems incorporated in this volume some topics may be mentioned showing different aspects of rotating fluid dynamics, e.g., waves in homogeneous and inhomogeneous fluids, baroclinic instability, frontogenesis, ocean circulation, magnetohydrodynamic waves, kinematic dynamo, convection in the Earth's core, turbulence. These are only a few subjects of a large number described in this book.

The scientist with special interest in geophysical applications of fluid dynamics will find a surprisingly broad spectrum of problems. This book supports the highly valuable effort to create a deeper understanding of the different geophysical applications of rotating fluid dynamics and to stimulate scientists working in this fascinating field. Graduate students interested in fluid dynamics should be able to follow the mathematics leading from basic ideas to current research problems. **Helmut Wilhelm, Karlsruhe**

P. Brosche and J. Sündermann (editors), *Tidal Friction and the Earth's Rotation*, 242 pages, Springer, Berlin Heidelberg New York, 1978

The book contains the proceedings of a workshop, held in September 1977 at the University of Bielefeld. In addition to a historical summary the twelve chapters of the book give an overview of the field both from the theoretical and the observational point of view. They start with three chapters on the classical techniques to obtain the temporal changes of the length of the day due to tidal deceleration during historic times including pre-telescopic, i.e., essentially eclipse observations, astronomical observations after 1600 and recent observations. These are followed by two chapters on the lunar laser ranging technique and gravimetric measurements. The former has meanwhile been superseded somewhat by more recent published results by the same authors. The latter chapter on gravimetric measurements is much less detailed than the balance of the book. The four following chapters are theoretical in nature with reports on tidal friction in the solid earth but mainly on oceanic tides. The three last chapters deal with changes of the length of the day during geologic time using fossil organism and a final chapter on pertinent geologic and geophysical data in precambrian times. Altogether the book constitutes a fine account of the status of the field which is both interesting for workers in the field but particularly for researchers in neighboring fields, where it may serve as a detailed but sufficiently concise account of recent developments in this very interesting interdisciplinary field of ocean dynamics, geophysics, astronomy, geology, geodesy and palaeontology. **F.M. Neubauer, Braunschweig**

Geothermics and Geothermal Energy. Editors: Ladislaus Rybach and Lajos Stegena. Contributions to Current Research in Geophysics (CCRG) 7, Reprinted from PAGEOPH. Birkhäuser Verlag, Basel Stuttgart, 1979

The rapidly growing interest in geothermal energy for an alternative energy source has raised many basic questions in geothermics, and stimulated much work of earth scientists in this heretofore somewhat neglected field. Especially, the necessity of contributions from many branches of geophysics, geology and mineralogy to the basic understanding of the causes, the development and the distribution of geothermal anomalies, as well as to the various aspects of their tentative utilisation for geothermal resources, has become evident.

For these reasons, a symposium 'Geothermics and Geothermal Energy' was suggested by the International Heat Flow Commission (IHFC) and held in August of 1977 at Durham, England at the occasion of the General Assembly of the International Association of Seismology and Physics of the Earth's Interior (IASPEI) and the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).

The reviewed volume contains most of the papers presented at that symposium, supplemented by several papers intended for presentation but not presented orally there.

It is subdivided into the sections: I. General Geothermics, II. Regional Heat Flow, III. Geothermal Potential, IV. Exploration, Characterisation and Exploitation of Geothermal Resources, V. Geothermal Effects of Hydrothermal Circulation.

Edited by two well-known specialists in this field and containing contributions by authors from many nations, the volume provides a full view on the international state of the art and is a well-fitting further addition to the established series CCRG.

J.R. Schopper, Clausthal-Zellerfeld