

Book reviews

Elastic Waves in the Earth

W. Pilant, *Elsevier Scientific, Amsterdam*

xiii + 493 pp. Dfl 100.00

For many years the available textbooks on theoretical seismology and seismic wave propagation have been somewhat limited in their scope, but now a number of new books have appeared in a very short space of time. The most compact of these is the book by Pilant which addresses a wide range of theoretical topics and for some areas gives also a summary of the observational results.

The book is based on a one-year course at the University of Pittsburgh and divides into two main sections. The first 16 chapters provide a fairly complete coverage of classical elastodynamics and include reflection and transmission of plane waves, Lamb's problem and simple surface wave problems. This is a sound treatment with considerable algebraic detail which repays careful reading. The remaining 17 chapters cover more complex propagation problems (multi-layered media, free oscillations), elastic wave dissipation and source theory. For some of these topics, in particular wave propagation in stratified media and the Earth's normal modes, the treatment is too brief to be ideal but extensive references are given to other work. Indeed a very valuable feature of this book is its comprehensive and up-to-date bibliography. The second half of the book is more loosely connected and the attempt to integrate observational results and theory by having successive chapters on each, whilst laudable, would have needed more space to give a balanced treatment.

Overall this is a useful textbook and guide to the trends of recent research. The presentation of the book is however marred by direct reproduction from typescript with a typeface that I did not find easy on the eye. A generous allocation of well-chosen figures have been somewhat mangled during the printing process so that self-adhesive corrections are supplied for some figures.

B. L. N. KENNETT

Geophysical Signal Analysis

E. A. Robinson and S. Treitel, *Prentice-Hall, Inc., Englewood Cliffs, N.J.*

xiv + 466 pp. £23.40

This new textbook may be regarded as a revised and expanded version of the Robinson-Treitel reader which has served as a very useful introduction to digital signal analysis over the last decade. This book gives a more coherent picture than was possible with the previous collection of papers.

The book itself is not specifically concerned with the details of seismic reflection work, from which most examples are taken, but the opening chapter does give a succinct account of the method and common data processing techniques. This treatment covers CDP stacking, velocity analysis, and the principles of deconvolution; and unusually keeps the assumptions implicit in standard processing techniques clearly displayed. A number of ideas introduced in this chapter are discussed at greater length in subsequent chapters.

One of the major themes running through this book is 'least-squares' estimation and this is applied in many different guises to prediction-error filtering, shaping filters, deconvolution and spectral estimation. The treatment, as would be expected, is in terms of digital time series from a communications engineering approach. Such discrete time analysis conforms to the way that seismic reflection data are recorded, but it should not be forgotten that the Earth may not conform to the discretization employed, e.g. what does one do when trying to remove a reverberation which has a periodicity which is not a simple multiple of the discrete time step? I would have liked to have seen a further discussion, than one brief appendix, of the connection between the discrete approach and the continuous variable viewpoint which will be most familiar to a student of the physical sciences. For migration, a wave theory based method, a continuous viewpoint is adopted in a discussion of Stolt's Fourier transform technique in frequency-wavenumber space.

In the treatment of deconvolution the emphasis is on plane-wave normal incidence propagation, but in a modern text it would seem appropriate to have some discussion of pre-stack filtering operations.

Overall this is a very useful book containing a large number of examples to illustrate the many algorithms which are discussed. Compared with the signal processing book by Claerbout the scope is more restricted but the treatment is more detailed.

B. L. N. KENNETT

Quantitative Seismology (two vols)

K. Aki and P. G. Richards, *W. H. Freeman, San Francisco*

934 pp. \$35.00 (£20.70 per volume)

This new two volume work fills a long standing need for a modern text on theoretical seismology. As a course book, these volumes should be very useful indeed. They are comprehensive and well illustrated with a good selection of well-chosen examples at the end of the chapters. They will also be helpful for reference on many topics.

The level of mathematical knowledge expected of the reader is somewhat uneven. Some explanations (separated from the main text in 'boxes') imply that only limited mathematical experience is assumed but in others the analysis is quite difficult.

The book is attractively presented and much use is made of 'boxes' to store historical digressions, detailed explanations and some mathematics.

Occasionally these interjections disrupt rather than enhance the flow of the text.

For the content provided these books are good value, but it is a pity that so high a premium is loaded on to cis Atlantic sales. The cover would lead one to expect more observed seismograms inside!

The first volume is intended as a textbook for basic courses in seismology. The introductory chapter gives an idea of the range of seismological investigations with some historical