The book is very much up-to-date, with many references even from late 1984. This is no doubt due to the fact that the author did his own typesetting while developing his lectures using a sophisticated text formatter. Also, the book is interspersed with computer programs that provide the reader with hands-on experience if s/he has a system with sufficiently large (graphical) capabilities at her/his disposal. This makes the book priceless, but even without it it is a very good buy.

Blackwells had the good idea to reprint Claerbout's earlier book (*Fundamentals of Geophysical Data Processing*). Apart from a few added references, nothing has changed in this edition. It looks at seismic data more from a statistical point of view, using time series analysis, and forms a good companion to *Imaging the Earth's Interior.*

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Seismic Wave Propagation in Stratified Media

B. L. N. Kennett, *Cambridge University Press, 1985*

£12.50, $24.95

The book presents a unified account of seismic wave generation and propagation in stratified media. This is a particularly valuable approach to disseminate one of the most important techniques which has been developed in recent years: the construction of theoretical seismograms as an aid to structural and source studies. The unified treatment is achieved through elaboration of the mathematics describing waves in laterally homogeneous media; at the same time proper credit to the original authors is given. All this makes the book a model mathematical treatise, accessible to all seismologists – including graduate students in seismology – absolutely necessary in the bookshelves of theoretical seismologists for some time to come.

The techniques developed in the book are very general thus they are applicable to a wide range of problems with distance scales which vary from a few kilometres in geophysical prospecting, to many thousands of kilometres for seismic phases returned from the Earth's core. The illustration of the theoretical results by using examples taken from reflection and refraction seismic surveys, as well as earthquake observations gives an excellent link between theory and observations. Many topics not normally covered in books on theoretical seismology, such as source representation theory, generalized ray theory and calculation of complete synthetic seismograms, including the very important wave effects arising from the presence of the Earth's surface, are treated systematically and with clearness.

The book is divided into 11 chapters. In the introduction the basic problems of seismology are described pointing out clearly the different approximations and consequent limitations of the theory of linear isotropic elasticity with special reference to anisotropy, attenuation and heterogeneity of the Earth. In chapter 2 the seismic displacement within a stratified medium is represented as a superposition of cylindrical wave elements modulated by angular terms dependent on source excitation. For each of these elements the development of the associated displacements and tractions with depth, z, is followed by means of sets of coupled first-order differential equations in z. Such coupled equations are well suited to the solution of initial value problems, and in this context the propagator matrix is introduced. In chapter 3 the construction of stress-displacement fields is discussed. Chapter 4

is devoted to the excitation of seismic waves by seismic sources. A physical source is represented by an equivalent force system within the medium. The reflection and transmission of seismic waves in stratified media are treated in chapters 5 and 6 introducing reflection and transmission matrices. These matrices can be related to the propagator matrix for a layered medium. Chapter 7 brings together the discussion of the excitation and reflection of seismic waves to construct the full response of a stratified medium to excitation by a source. This response is used to generate theoretical seismograms by direct integration over the cylindrical wave representation. The nature of seismic records is considered in chapter 8; the analysis is made as a function of distance from the source and frequency content and the obtained results constitute the guide to the appropriate approximations developed in the remaining chapters.

This is a very good textbook, and quite pleasant to be read because it contains a proper amount of very illustrating figures.

G. F. PANZA, *Università Degli Studi di Trieste*

Constitution of the Earth's Interior

Volume 1 of *Physics and Evolution of the Earth's Interior* (Roman Teisseyre, series ed.)

J. Leliwa-Kopyetyński and R. Teisseyre (eds), *Elsevier, New York, 1983*

368 pp., $83.00 (USA and Canada); Dfl. 195.00 (rest of world), ISBN 0 444 99646 X

This is Volume 1 of a comprehensive series of contemporary studies of the interior of the Earth, and is concerned with stationary models for the distributions of pressure, density, temperature, acceleration of gravity, mineral composition and phase transitions. Other volumes in the series are concerned with the propagation of seismic waves, continuum theories of solid earth physics, and with gravity and low-frequency geodynamics.

It should be said at once that this is a theoretical book. There are eight chapters written by five contributors. The aim is to present a comprehensive review and comment on the physical principles underlying our present knowledge of the Earth and this the authors do very well. The study involves both present conditions and inferred earlier evolution. Other volumes are planned.

After a table listing the basic parameters of the Earth and the masses and radii of the planets (the Moon and Pluto are excluded from the table although some comment is made about the interior structure of the Moon later), the arguments begin with a nicely detailed description of the equations of state of materials of geophysical importance. Then follow discussions of the various internal earth models, creep processes and viscosity models, thermal energy and internal heat flow and the theory of phase transformations both established and hypothetical. The book ends with a chapter on petrology and the elements of geochemistry. The arguments are well presented and generally complete. The necessary mathematics is also included but in a way which properly illuminates the text. The authors make their own comments on the theories they describe and relate them (rather formally it is true) to the appropriate experimental and observational material.