

# Propagation of Transient Elastic Waves in Stratified Anisotropic Media (North-Holland Series in Applied Mathematics and Mechanics)

J.H.M.T. van der Hijden



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Seismic waves are one of the standard diagnostic tools used to determine the mechanical parameters (volume density of mass, compressibility, elastic stiffness) in the interior of the earth and the geometry of subsurface structures. There is increasing evidence that in the interpretation of seismic data - especially shear-wave data - the influence of anisotropy must be taken into account.

This volume presents a method to compute the seismic waves that are generated by an impulsive source in a stratified anisotropic medium. Although written with the seismic applications in mind, the method that is developed is not limited to solid-earth geophysics. In fact, the methods discussed in this monograph are applicable wherever waves propagate in stratified, anisotropic media.

The standard approach to this problem is to employ Fourier transformations with respect to time and with respect to the horizontal spatial coordinates. To obtain numerical results, the relevant inverse transformations then have to be evaluated numerically. In this monograph the problem is, in contrast to the standard approach, solved by applying the Cagniard-de Hoop method and by representing the wave field as a sum of generalized rays. With this method, the computational results can be obtained relatively easily with any degree of accuracy, and with considerably less computation time. For completeness, analysis of acoustic waves in stratified isotropic media is included. Furthermore, for large horizontal or vertical source-receiver separations very efficient approximations are derived. Several examples and applications are given.

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