Inversion of seismic reflection data of 3-D heterogeneous anisotropic earth via Genetic Algorithm

Himanshu Bhardwaj and U. K. Singh Indian School of Mines, Dhanbad-826 004, India

In geophysical inverse problems, use of Genetic Algorithms (GA) is a relatively recent development and offers many advantages in dealing with the nonlinearity inherent in such applications. However, in their application to specific problems, as with all algorithms, problems of implementation arise. After extensive numerical tests, we implemented the GA to efficiently invert several sets of synthetic seismic reflection data. This study investigate the application of global optimization method such as GA method in determining the anisotropic behavior of the medium through which seismic wave propagates. In this paper a synthetic seismic reflection data is generated for 3-D anisotropic earth structure by finite difference method and twenty one component of stiffness tensor and the density are determined using the GA method. A second order finite difference solution to anisotropic wave equation is produced and then inverted by GA. The results obtained by GA global optimization method agree well with the model parameter of the synthetic reflection data.

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