

Research topics (June 2016)

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1. A quantitative criterion whether the SH and SV reference rays are better than the anisotropic common reference rays in a given velocity model, or vice versa.
2. Tracing the SH and SV reference rays in velocity models with generally heterogeneous dependence of the reference symmetry vector on the spatial coordinates.
3. Summation of the coupling-ray-theory Gaussian beams.
4. Interpolation of the prevailing-frequency approximation of the coupling-ray-theory S-wave Green tensor within ray cells in anisotropic media.
5. Anisotropic-common-ray approximation of the coupling ray theory: initial conditions, structural interfaces.
6. The SH and SV reference rays for the coupling ray theory: initial conditions, structural interfaces.

7. Extension of the numerical algorithm of the common-source Kirchhoff prestack depth migration to three-component seismograms.
8. Common-source Kirchhoff prestack depth migration with coupling-ray-theory S waves.
9. Wavefield sensitivity to structural Gabor functions (sensitivity beams and packets). Linearized inversion based on Gaussian sensitivity packets.
10. Calculation and interpolation of the geometrical crossvariances of theoretical travel times for the nonlinear kinematic hypocentre determination.
11. Continuing to study problems related to smoothing velocity models for ray methods.
12. Theoretical or numerical studies of the phase-slowness and ray-velocity surfaces of elastic waves.
13. Viscoelastic waves with a non-symmetric stiffness matrix.

14. Anisotropic ray theory for electromagnetic waves in a heterogeneous bianisotropic structure.
15. Coupling ray theory for electromagnetic waves in a heterogeneous bianisotropic structure.
16. Summation of Gaussian beams for electromagnetic waves.
17. Theoretical or numerical studies of the phase-slowness and ray-velocity surfaces of electromagnetic waves.