KINEMATICAL PARAMETERS OF CONVERTED WAVES IN ORTHORHOMBIC MEDIA

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Converted waves bring an important additional information about subsurface. Therefore, it is important to define their kinematical properties in anisotropic media. For transversely isotropic media with a vertical symmetry axis (VTI), the qP- and qSV-waves are of importance to investigate the properties of converted waves, while they haves no conversion to qSH-wave. For a general orthorhombic medium (ORT), one cannot distinguish between qSV- and qSH-waves, and they are called S1- and S2-waves. While the kinematical properties of converted waves in a VTI medium are well known, to define them in ORT media is rather complicated problem.

I propose a method to define the kinematical properties of converted PS1-, PS2- and S1S2-waves in a homogeneous and multilayered ORT media. These kinematical properties are: the vertical velocity, the normal moveout velocities in vertical symmetry planes and three anisotropic parameters η (two of them are defined in vertical symmetry planes, and the third one is defined in horizontal symmetry plane).

The method is based on computation of curvatures of the slowness surface from individual modes and averaging these curvatures depending on selected conversion type. The extension of proposed method for a multilayered medium is based on similar averaging but with weights proportional to the corresponding layer thicknesses.

To illustrate this method I compute the azimuth-dependent NMO ellipses and anelliptic properties of converted waves being defined in phase and group domain. Four homogeneous ORT models are used as the numerical examples. To illustrate the layering effect, the multilayered model is composed from these four models.