Analytic Formulae for Wave Normal of P-Waves in TI and Orthorhombic Media

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Abstract

We present analytic and approximate formulae for wave normal (phase propagation direction) of P-waves in terms of directions of polarization vector and Umov-Poynting vector for transversely isotropic (TI) and orthorhombic media. All proposed formulae are tested by numerical examples. The proposed formulae are useful for extracting incident angle domain common image gathers for TI and orthorhombic media.

The proposed formulae for the wave normal of P-waves in orthorhombic media are second-order accurate with respect to Thomsen-type parameters. For TI media, the proposed formulae for the wave normal in terms of anellipticity parameters are more accurate than the proposed formulae in terms of Thomsen parameters.