Attenuation analysis for azimuthally anisotropic media

Ilya Tsvankin, Center for Wave Phenomena, Department of Geophysics, Colorado School of Mines, Golden, CO 80401-1887

Asymmetric P-wave reflection coefficient for a nonzero inhomogeneity angle

Reflection coefficients in attenuative models depend on the “inhomogeneity” angle $\xi$ between the real ($\mathbf{k}$) and imaginary ($\mathbf{k}'$) components of the wave vector (the top plots). Our analysis demonstrates that if the incident wave has a nonzero angle $\xi$ (i.e., the direction of maximum attenuation deviates from the direction of wave propagation), the form of the linearized plane-wave reflection coefficient $R_{\text{pp}}$ is different from the conventional expression widely used for non-attenuative media. In particular, the PP-wave reflection coefficient is no longer an even function of the incidence angle $\theta$. However, as illustrated by the plots on the bottom, the contribution of the inhomogeneity angle becomes significant only when attenuation is extremely strong, with the quality factor $Q<5$. 