

EFFECTIVE REFLECTION COEFFICIENTS FOR SEISMIC WAVEFIELDS AT CURVED INTERFACES

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Introduction. Rigorous analytic description of reflected and transmitted wavefields is of great importance for forward and inverse problems of mathematical wave theory. This study has been for many years devoted to improvement of reflected and transmitted wavefields description in complex 3D media with curved interfaces. The transmission-propagation operator theory developed in [1, 2] describes the wave structure of total wavefield using the transmission/reflection operators at curved interfaces. This theory proposes to generalize spatial-frequency decomposition (plane-wave summation or slowness) methods to curved interfaces and inhomogeneous media. This abstract summarizes a study of seismic-frequency approximation of the reflection and transmission operators at curved interfaces in terms of effective reflection (ERC) and transmission coefficients. The ERCs generalize the plane-wave (PWRC) and spherical-wave (SpRC) reflection coefficients for waves generated by point sources and reflected at curved interfaces [3].

ERC-based AVO inversion. To test the applicability of ERCs in seismic diffraction modelling and AVO inversion we performed AVO inversion for three different AVO function: PWRC-, SpRC- and ERC-based. Modeling of the synthetic seismogram is performed by 2D FD method. Figure 1 describes the model. On Figure 2 represents the AVO response obtained from the synthetic data by the technique suggested by [4] and ERC-based and SpRC-based AVO functions. Table 1 illustrates estimated parameters and the relative errors in the AVO inversion results. [5].

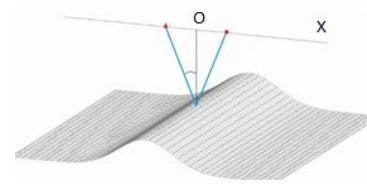


Figure 1 Reflecting interface and acquisition setup used for synthetic modelling.

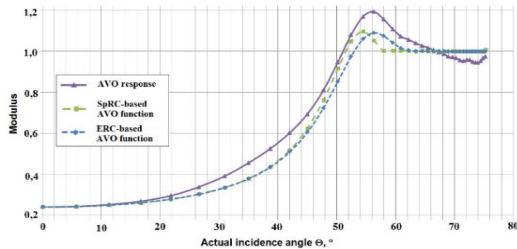


Figure 2. AVO response and AVO functions

	V_{p2} (km/s)	ΔV_{p2} (%)	ρ_2 (g/cm ³)	$\Delta \rho_2$ (%)
Modified ERC	2,88	2,7	2,13	1,5
SpRC	3,0	7,1	1,9	11,0
PWRC	3,2	14,6	2,4	14,2

Table 1 Parameter estimates obtained from the AVO inversion

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