Amplitude variation with offset (AVO) inversion modeling with a local elastic solver

LIGIA ELENA, JAIMES OSORIO, AND ALISON MALCOLM

Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador A1B 3X5, Canada

Conventional amplitude variation with offset (AVO) inversion analysis uses Zoeppritz equations, which are based on a plane wave approximation. However, since real seismic data are created by point sources, the wave reflections are better modeled by spherical waves than planar waves. Indeed, spherical reflection coefficients vary from planar reflection coefficients near to the critical and post-critical angles. This implies that the Zoeppritz equations are not applicable in the presence of critical angles in AVO analysis.

Spherical reflection methods such as full waveform inversion provide a solution to the limitation of the Zoeppritz approximation, since they can handle near and post-critical reflections. Additional advantages of full waveform inversion are its applicability to heterogeneous models and its iterative multiparameter inversion. In this study, we propose to model amplitude variation with offset (AVO) using an elastic solver to model the wavefields and then compare these results with the Zoeppritz approximation.

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