LONG OFFSET EFFECTS IN ISOTROPIC AND ANISOTROPIC AVO: EXPERIMENT VERSUS THEORY

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A spherical wave AVO response is investigated by measuring ultrasonic reflection amplitudes from a water/Plexiglas interface. The experimental results show substantial deviation from the plane-wave reflection coefficients at large angles. However there is an excellent agreement between experimental data and full-wave numerical simulations performed with the reflectivity algorithm. By comparing the spherical-wave AVO response, modelled with different frequencies, to the plane-wave response, we show that the differences between the two are of such magnitude that three-term AVO inversion based on the AVA curvature can be erroneous. We then propose an alternative approach to use critical angle information extracted from AVA curves, and show that this leads to a significant improvement of the estimation of elastic parameters. Azimuthal variation of the AVO response of a vertically fractured model also shows good agreement with anisotropic reflectivity simulations, especially in terms of extracted critical angles.

Technical Area: AVO