Turning-Ray Tomography and Tomostatics

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Abstract

Turning-ray tomography is a good tool for estimating near surface velocity structure, especially in areas where conventional refraction statics fail such as the case of a hidden layer. The velocity model from turning-ray tomography can be used for static correction, starting models for Full Waveform Inversion (FWI), wave equation datuming and prestack depth migration. In this research, we apply turning-ray tomography to the statics problem of the Hussar 2D seismic line. This process is commonly referred to as tomostatics. The traveltime tomography approach used in this study is similar to the constrained damped simultaneous iterative reconstruction technique (CDSIRT) of Zhu et al, (1992). To verify results from tomostatics, we compare datasets after tomostatics with datasets using the delay-time method of conventional refraction statics. Our result shows that the velocity model from turning-ray tomography reveals a hidden, slow velocity layer between two fast velocity layers that conventional refraction statics would not detect. The hidden layer is in agreement with the interval velocities from well logs. As we would expect, the stacked section, after applying tomostatics, shows better continuity of events compared to the stacked section from conventional refraction statics.

Reference Cited

Zhu, X., Sixta, D.P., and Angstman, B.G., 1992, Tomostatics: Turning-ray tomography + statics corrections: The Leading Edge, Vol. 11, No. 12, 15-23.