

VELOCITY IN THE SEDIMENTARY LAYERS FROM POST-CRITICAL REFLECTIONS

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The standard approach to traveltimes inversion in layered models allows us to recognize velocities using refracted waves observations and describe the shapes of boundaries using reflected waves. This idea works well in crustal studies where we observe high vertical velocity gradients and sharp velocity contrasts on interfaces. In case of sedimentary layers this situation is different. Velocities in each layer are almost constant and boundary contrasts are weak. In this scenario dominant wide angle signals in form of post-critical reflections are often observed.

This presentation shows an alternative inversion strategy, where a wide angle reflections are used to find the velocities in corresponding layers. A detailed synthetic analysis for a sedimentary layers shows that refraction is giving information about the upper part of a layer, and cannot give reliable estimation of velocities, especially in the deeper part. Using a joint inversion of both refractions and reflections including post-critical observations significantly improves the uncertainties of velocities. Besides synthetic tests, a field data interpretation is presented. During the standard reflection seismic experiment Żelazny-Most 2D with vibratory sources an additional full spread refractions has been recorded. Those data are combined with near-vertical reflections interpreted from reflection seismic for the best possible results. This analysis shows that this approach gives the possibility to significantly enhance the velocity information with cheap and easy to perform observations.