

DECOMPOSITION OF MULTI-COMPONENT SEISMIC DATA INTO PRIMARY P- AND S-WAVE RESPONSES (B-26)

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Inversion of multi-component seismic data can be subdivided in three main processes:

(1) surface related preprocessing (decomposition of the multi-component data into primary P- and S-wave responses);

(2) prestack migration of the primary P- and S-wave responses, yielding the (angle-dependent) P-P, P-S, S-P and S-S reflectivity of the subsurface;

(3) target related post-processing (transformation of the reflectivity into the rock and pore parameters in the target).

This paper deals with the theoretical aspects of surface related preprocessing. It consists of two steps:

(1) Decomposition of the multi-component data (pseudo P- and S-wave responses) into true P- and S-wave responses. In practice this procedure involves

(a) decomposition per common shot record of the velocity vector into scalar upgoing P- and S-waves, followed by

(b) decomposition per common receiver record of the traction vector into scalar downgoing P- and S-waves.

(2) Elimination of the surface related multiple reflections and conversions. In this procedure the free surface is replaced by a reflection free surface. The effect is that we obtain 'primary' P- and S-wave responses.

After surface related preprocessing, the scalar P- and S-wave responses can be further processed independently by existing scalar algorithms. The theory will be illustrated with an example.

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