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Deconvolution of cross-hole data

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INTRODUCTION

One of the works of the cross-hole SEP subseminar during the summer quarter, 1990 was processing 3-component data obtained using an experimental borehole vibrosource. In (Cole and Karrenbach,1990) the "rotation" of the data is described. Technically the rotation is transformation of the coordinate system and respectively the components of the data; new axes were chosen the following way: 1) along the direction source-receiver, 2) normal to the first axis in the vertical plane, 3) perpendicular to the vertical plane. The purpose of such processing is separating the waves with different types to have more chances to detect the possible presence of SH-wave. Beyond the rotation Cole and Karrenbach also estimated the wavelet and I used their estimate to make deconvolution of the data. The idea was that after such processing it would be possible to see SH-wave.

THE RESULTS OF PROCESSING

For deconvolution I used a simple algorithm (Dwork, 1950):

$$D(f) = \frac{S_0^*(f)}{S(f)S^*(f) + N(f)N^*(f)}.$$

Here D is the deconvolution filter, S_0 is the estimated wavelet, S is the signal in real data, and N is noise. Asterisk shows complex-conjugate values.

Figures **??**, **??**, and **??** show the the comparison of the data before and after deconvolution. Obviously, the P- and SV-wave have been sharpened but the result for the channel where we hoped to see the SH-wave is not encouraging. Probably our next step will be applying our approach to the full dataset where we can use stacking to enhance low-amplitude signal.

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REFERENCES

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