



**ESTIMATING ATTENUATION, PHASE ANGLE
GROUP VELOCITY OF SURFACE WAVES
OBSERVED ON A 2D SHALLOW SEISMIC LINE
USING CONTINUOUS WAVELET TRANSFORM.**

M. Holschneider (1), M. S. Diallo (1), M. Kulesh (1), F. Scherbaum (2), M. Ohrnberger (2)

(1) Angewandte Mathematik, Universität Potsdam. (2) Institut für Geowissenschaften, Universität Potsdam. (Contact: mamadou@math.uni-potsdam.de, Fax: 00 49 331 977 1578.)

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Estimating attenuation, phase and group velocity of surface waves observed on a 2D shallow seismic line using continuous wavelet transform.

M. Holschneider, M., S. Diallo, M. Kulesh, F. Scherbaum, M. Ohrnberger

This contribution is concerned with the estimate of attenuation and dispersion characteristics of surface waves observed on a shallow seismic line. The analysis is based on a initial parameterization of the phase and attenuation functions which are then estimated by minimizing a properly defined cost function via a Levenberg-Marquardt inversion procedure. To minimize the effect of random noise on the estimates of dispersion and attenuation we use cross-correlations (in Fourier domain) of preselected traces from some region of interest along the survey line. These cross-correlations are then expressed in terms of the parameterized attenuation and phase functions and the auto-correlation of the so-called source trace or reference traces. Cross-correlation that enter the optimization are selected so as to provide an average estimate of both the attenuation function and the phase (group) velocity of the area under investigation. As the phase velocity is derived from the phase, and the group velocity from the amplitude maxima in the wavelet spectrum, these two quantities are differently affect by noise. It is therefore important to extract them independently in order to avoid propagating errors from the phase velocity estimate to the group velocity or vice versa. Using the presented approach in conjunction with the wavelet propagation operator (Kulesh et al., 2003) one can simultaneously obtain the attenuation function, the phase and the group velocity. Results from the application of this dispersion and attenuation analysis method are shown for both synthetic and real 2D shallow seismic data sets.

References

- [1] M. Kulesh, M. Holschneider, M. S. Diallo, Q. Xie and F. Scherbaum, Modeling of Wave Dispersion Using Wavelet Transfrom (Submitted to Pure and Applied

Geophysics).