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ADAPTIVE PICKING OF REFRACTED FIRST ARRIVALS (3-21)

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Fully automatic procedures of static corrections computation often require algorithms that are able to exploit the multiple coverage supplied by the seismic survey. These, in turn, require reliable algorithms for automatic picking of refracted first arrivals: in fact, one of the most relevant problems in refracted arrivals inversion is the accurate estimation of their traveltimes. Incoherent techniques, e.g. those based on energy measurement along the trace, fail or behave poorly whenever the source wavelet is zero-phase or when the signal-to-noise ratio is low. Reliable results are obtained for Vibroseis sources using a coherent technique based on wavelet recognition.

I present a method of coherent picking based on adaptive matched filtering. This technique provides the maximum resolution allowed by signal bandwidth and improves the signal-to-noise ratio. The complex signal, output of a filter matched to the first arrivals, is calculated, together with its instantaneous amplitudes and phases. The instantaneous phases at the peaks of the envelope provide better information on the time consistency and the quality of the pick. The instantaneous amplitudes at the peak control the adaptivity of the algorithm, thus allowing variations of the filter wavelet both with shot and offset. An incoherent picking before the coherent one improves convergence when iterations are needed to determine the filter wavelet.

The method has been successfully applied to Vibroseis data and the dromocrones that result from different picking algorithms are compared. Stacked sections are also presented and wavenumber domain techniques are used for the inversion.

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