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# On the geophone coupling function in marine research

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In marine research the so-called P-Z summation is used in order to suppress receiver-side multiple reflections and improve the quality and resolution of target signals of reflected waves. This procedure is the summation of hydrophone and geophone data, based on the fact that the geophone and hydrophone perceive downgoing signals from the water-air surface with different signs [2]. Despite the fact that such a procedure is considered classical, it often turns out in practice that its implementation is not easy without additional processing of geophone data. The geophone data can be very noisy and record P-waves with various amplitude-phase distortions due to the fact that it is impossible to control the position of the sensors on bottom and their bottom coupling.

In this paper we present the algorithm for additional processing of geophone data - the definition of the so-called geophone coupling function, which includes correction of geophone data both for poor bottom coupling and for other distortions of the signal recorded by the geophone associated with the geophone itself and its position on the bottom. The developed algorithm consists of two stages. The first stage is the construction of a signature filter, which allows us to obtain data from an “ideal” geophone (geophone with ideal coupling) from hydrophone data. The second stage is comparing the data of an ideal geophone with the data of a real geophone using spectral-correlation analysis methods [1] and constructing a transition coefficient, which determines the so-called geophone coupling function. The definition and application of the geophone coupling function is shown using the example of traces of real seismic data from marine seismic exploration.

References

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