

Summary

This work deals with the application of seismic methods in high-resolution near-surface prospection. Two topics are covered in this text. The first one describes processing and application of 3D shallow seismic refraction, while the second one deals with possible methods of identification and filtration of S-waves.

The processing of the 3D seismic refraction data is currently carried out mainly by means of the seismic tomography. Because the tomography method usually works with the gradient model of the subsurface, an approach to the layer-based model was sought. The solution was found in a modification of the time-term method. The time-term method was modified to handle also the lateral variations of velocity in highly heterogeneous media. REFRACT3D computer program for data processing using the time-term method was developed. The modified time-term method was successfully tested during the archaeological prospection of the Děvín Castle and during the prospection of the shallow subsurface of the Ostaš seismic station. The results from the time-term method were compared with the results obtained by the first arrival travel time tomography. In the case of the Děvín Castle the time-term results surpass the tomography one, while at the locality of Ostaš the tomography results are better. The imaging of subsurface using the S-waves is a very good supplement to the conventional P-wave surveys. However, problems with the identification of S-wave onsets and S-wave wave forms make it a very demanding task. Usually, a special S-wave source is needed for the S-wave survey. Unfortunately, the S-waves sources suffers from a very low generated energy or are heavy, clumsy and expensive. Even though conventional P-wave sources also produce sufficient amount of S-waves, their usage in S-wave prospection is limited due to the problems with onset identification. In this work two methods of S-wave identification are presented. The first one is a modification, or elaboration, of the classical method - polarity reversals. It was modified in such a way, that it enables separation of SH and SV waves. The second method tries to identify S-waves according to the similarity of waveforms on the neighbouring records and thus can use also the simple P-wave sources, like sledgehammer. The latter one was used in the prospection of the subsurface of the Nečtiny seismic station and its results are presented in this text.