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APPLICATION OF THE HORIZONTAL TO VERTICAL SPECTRAL RATIO TECHNIQUE FOR ESTIMATING THE SITE CHARACTERISTICS OF GROUND MOTION CAUSED BY MINING INDUCED SEISMIC EVENTS

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A b s t r a c t

The work presents an attempt of application of the horizontal-to-vertical spectral ratio (HVSR) method for estimating the local amplification of ground motion caused by mining seismic events in the Legnica Głogów Copper District. Amplifying properties of the surface layer are assessed from the ratio of amplitude spectra of the horizontal and vertical components of ground acceleration, recorded at the surface. The location of a local maximum of the ratio in the frequency band up to 8 Hz assigns the resonant frequency of the surface layer; the maximal value estimates the amplification factor at the measurement point.

The spectral ratio was evaluated for 219 ground acceleration records from ten recording stations. The HVSR curves for induced seismicity turned out to be similar to the typical HVSR-s for natural earthquakes. Amplification factors estimated by the HVSR method were used to reduce the observed peak ground accelerations (PGA-s) to the bedrock. The reduction significantly improved an agreement between the PGA values order and the order of epicentral distances. The obtained results suggest that the HVSR method can be successfully used to evaluate the local influence of the surface layer also for induced seismicity, in spite of the fact that in this case the conditions for application of the method essentially differ from the conditions met in natural seismicity.

Key words: site effects, site amplification, spectral ratio, HVSR method, induced seismicity.