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Simulation of the Microtremor H/V Spectrum Based on the Theory of Surface Wave Propagation in a Layered Half-space

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Abstract

Subsurface velocity structures must be estimated to predict long-period ground motions and seismic hazards. Subsurface velocity structures can be constructed via an inversion of the horizontal-to-vertical (H/V) spectral ratio of microtremor (MHV) curves; thus, a method of simulating the MHV curves is key. In this study, we use the H/V spectral ratio of the surface wave (SHV) based on the surface wave propagation theory in a layered half-space to simulate the MHV curves at sites A and B of the Yuxi basin. Then, we attempt to analyze the features of the SHV curves. We find the H/V ratio of the microtremor loading source to be independent of the peak frequency of the SHV curve, but it has some relation to the amplitude of the SHV curve. Moreover, to reduce the error in subsurface velocity structures obtained by the MHV curves, we suggest that the SHV curves at near-peak frequencies should not be considered in the inversion, because the amplitude deviation is higher at the peak frequency of the MHV curve. In addition, the best frequency ranges for the inversion of the microtremor H/V spectrum are between the peak and trough frequencies of the microtremor H/V spectrum.

Key words: seismic hazard, velocity structure, microtremor, surface wave H/V spectrum, microtremor loading source.

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