

Surface wave propagation in the large-scale sedimentary basin: distinct lateral variation of Love wave velocity around m

TAKEMURA, Shunsuke^{1*} ; YOSHIMOTO, Kazuo¹

¹Yokohama City University

By detailed analysis of surface waves recorded at dense seismic arrays in Kanto, sudden change of Love wave velocity for frequency of 0.125-0.25 Hz is found at very narrow, 20 km by 20km, region of southern Saitama.

To clarify cause of such sudden change and characteristics of surface wave propagation in thick sediments, we conducted 3D FDM simulations of seismic wave propagation assuming various basement structure (interface between sediments and bedrock) or velocity structure models in the sediments. Our simulations demonstrated that propagation velocity of Love wave is mainly controlled by shallower velocity structure at depth less than 1.5 km, rather than deeper basement structure. Our results were supported by the analysis of sensitivity kernel of Love wave in the sediments.

We constructed S-wave velocity structure in the sediments of Kanto basin using interpolation technique from 14 boreholes VSP measurements and surface wave analysis in this study. To confirm validity of our modeling, we conducted 3D FDM simulations of seismic wave propagation using constructed velocity structure and compared simulation results with observation. Our simulation results well reproduced peak amplitude and propagation velocity of Love wave for frequency of 0.125-0.25 Hz. Our results indicates that realistic modeling of shallower velocity structure and impedance contrast at the sediments-bedrock interface is important for precise evaluation of long-period ground motion in thick sedimentary basin.

Acknowledgement

We acknowledge the National Research Institute for Earth Science and Disaster Prevention, Japan (NIED) for providing the K-NET/KiK-net waveform data. We also use strong motion data from SK-net. The computations were conducted on the Earth Simulator at the Japan Marine Science and Technology Center (JAMSTEC).

Keywords: long-period ground motion, basin structure, numerical simulation, surface wave