



Study on Estimation of Subsurface Velocity Structure Model using Waveform Inversion

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ABSTRACT: The estimation of layered velocity model by waveform inversion using observed ground motion records is one of ways for modeling deep subsurface structure for the numerical simulation of long-period ground motion. The effectiveness and problem of the estimation by waveform inversion are examined. The numerical test of the waveform inversion using simulated waveform gives good estimation of velocity model assumed beforehand, without constraints of number of layers and velocity of each layers. The case study of application to strong ground motion records at OJIYA, K-NET is conducted. The estimated velocity model by waveform inversion corresponds to the estimated velocity models based on geophysical exploration, geomorphology and geology in previous research. The effect of spatial irregularity of subsurface structure is examined using FDM simulation and waveform inversion. In waveform inversion, the waveform affected by spatial irregularity of subsurface structure gives distorted estimations of the velocity structure. In the region around epicenter, the waveform is not affected by spatial irregularity of subsurface structure so much. In the estimation of velocity model, therefore, the effect of spatial irregularity is small in the region.

Key Words: Long-period Ground Motion, Discrete Wave-number Method, Subsurface Velocity Structure, S-Wave Velocity, Waveform Inversion