Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SSS25-20 Room:A04 Time:May 25 16:15-16:30

Broadband ground motion simulation techniques applied to megathrust earthquakes in the Sagami trough

IWAKI, Asako[1*] ; MAEDA, Takahiro[1] ; MORIKAWA, Nobuyuki[1] ; FUJIWARA, Hiroyuki[1]

[1]NIED

Long-period (~1s and longer) ground motion are generally evaluated by a theoretical computation method based on appropriate models of rupture process and three-dimensional (3D) wave propagation process. We have been working on seismic hazard assessment for long-period ground motion of various scenarios of the megathrust earthquakes in the Sagami trough (e.g. Iwaki et al. 2014, JEES). The period range of the analysis was limited to 3s and longer due to the resolution of the source and velocity structure models.

On the other hand, it is necessary to include shorter-period ground motion to the seismic evaluation as the source fault on the Sagami trough lies directly beneath the metropolitan area. In order to achieve this goal, Maeda et al. (2015, this meeting) apply short-scale source and velocity structure models in the ground motion simulation by theoretical computation method. This paper presents alternative approach: broadband ground motion simulation techniques that include stochastic or semi-empirical methods.

We apply the “hybrid method” for broadband ground motion simulation by NIED (e.g. Senna et al. 2004) to M8 class earthquakes in the Sagami trough. It is the hybrid of finite-difference method (FDM) and the stochastic Green’s function (SGF) method in the long- and short-period ranges, respectively. In addition, we try another method proposed by Iwaki and Fujiwara (2013) and compare the methods. The latter method simulate high-frequency (short-period) ground motion using low-frequency (long-period) ground motion and the empirical “envelope ratio function (ERF)” between high- and low-frequency acceleration envelopes.

For both methods, the long-period ground motion is computed by a 3D FDM (GMS; Aoi et al., 2004) and combined with the short-period ground motion at the cross-over period 2s.

We compared the methods in terms of the computed velocity waveforms and Fourier spectra at several sites within the Kanto plain. The amplitude levels of the main motion for the two methods are similar to each other. However, the considerable difference is observed at some sites in the later phases where hybrid method produces smaller short-period components.

In order to compare and investigate the appropriateness of the two methods, it is necessary to compare the resulting ground motion with the GMPEs. We aim to utilize these methods in broadband seismic hazard evaluation.

Keywords: megathrust earthquake, long-period ground motion, broadband ground motion, Sagami trough, Kanto plain