Strong ground motion simulation of the Fukushima-ken Oki earthquake of February 13, 2021 (Mj 7.3)

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We conducted strong ground motion simulations of the Fukushima-ken Oki earthquake of February 13, 23:07 (JST) with Mj 7.3. As a preliminary model, we used a point source and corrected empirical Green’s function method (Kowada et al., 1998; Nozu and Sugano, 2008; Nozu et al., 2009) for the simulation. This model uses the omega-square model as the source spectrum and considers path effect, empirical site amplifications, and empirical phase characteristics to synthesize strong motions. Nineteen K-NET and KiK-net stations are selected as the target. We used empirical site amplification factors by Nozu and Nagao (2005), and empirical site phase characteristics from the observed records of an aftershock occurred on February 15 at 21:26 JST (Mj 5.3).

We fixed the location of the subevent at the hypocenter and determined the seismic moment (=0.8e+19 Nm) and the corner frequency (0.9 Hz) by trial and error. Parameters to consider multiple nonlinear effects (Nozu and Sugano, 2008) are introduced to explain observed strong motions at some stations. Comparisons of observations and synthetics in terms of velocity time histories (0.2 to 2 Hz) and spectral accelerations are shown in the figure.

Good agreements are shown at most of the target stations. On the other hand, at FKS001 (K-NET Soma) where one of the biggest motions were recorded, the peak at 1-2 Hz and the duration of the strong motions are underestimated. We will work on improving the model, for example, by considering the directivity effect to Soma area, multiple asperities, and so on.

Keywords: Strong ground motion simulation, Fukushima-ken Oki earthquake of February 13, 2021, Source model