Near-field Long-period strong ground motion during the 2016 Mw 7.0 Kumamoto earthquake

* Kojiro Irikura , Susumu Kurahashi
Aichi Institute of Technology, Toyota, Japan

The mainshock with Mw 7.0 of the 2016 Kumamoto earthquake occurred at 01:25JST on April 16, 2016 along the Futagawa fault zone and the northern part of the Hinagu fault zone. Surface breaks caused by the mainshock were found associated with Futagawa-Hinagu fault system by field surveys (Earthquake Research Institute, 2016). Near-field strong motions with high accuracy during the earthquake were recorded by the NIED strong motion network (K-NET and KiK-net) and the JMA and local-government seismic-intensity network. In particular, there are located two stations, Mashiki town-hall (MTH) about 2 km and Nishihara village-hall (NVH) about 1 km close to the surface traces along the Futagawa fault zone (Iwata, 2016). We simulated the ground motions of the 2016 Kumamoto earthquake using a characterized source model consisting of strong motion generation areas (SMGAs) based on the empirical Green's function (EGF) method. The locations and areas of the SMGAs were determined inside the seismogenic zone deeper than 3 km through comparison between the synthetic ground motions and observed motions. The synthetic ground motions obtained using the EGF method agree well with the observed motions in terms of acceleration, velocity, and displacement within the period range of 0.1 to 3 s (Irikura et al., 2017). However, the long-period motions more than 3 s seen at MTH and NVH are not well simulated against the observation. We put a long-period motion generation area near Earth surface above the SMGA to produce long-period ground motions. The ground motions at MTH and NVH show clearly the fling steps as shown in near-field ground motions during the 1992 Landers earthquake (Hisada and Bielak, 2003). We assume a long-period (about 3 s) modified-ramp-functions as slip velocity time functions on the LMGA learning from the inversion results of Kubo et al. (2016). The synthetic ground motions as a sum of ground motions from the SMGA and those from the LMGA agree well with the observed ones.