

## Source Modeling and Broadband Ground Motion Simulation for the 2007 Niigata-ken Chuetsu-oki Earthquake (2)

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The 2007 Chuetsu-oki earthquake, which occurred near a nuclear power plant along the west coast of Japan, is characterized by difficulty determining the source fault plane (e.g., Koketsu et al., 2007). Three significant strong pulses over the design criteria were observed at the Kashiwazaki-Kariwa nuclear power plant (K-K plant). To explore the plausible fault planes (SE-dipping and/or NW-dipping fault planes), Miyake and Koketsu (2007) have carried out empirical Green's function simulations for the earthquake using near-fault strong motions of K-NET, KiK-net, Niigata prefecture, JMA, and TEPCO.

Because the predominant frequencies of the observed strong motion records are higher than the upper limit of the frequency band used in the waveform inversions, we performed broadband ground motion simulations, employing the empirical Green's function method (Irikura, 1986). We used the records of the Mw 4.4 aftershock with a frequency band of 0.2 to 10 Hz as empirical Green's functions, and estimated the size and stress drop of three strong motion generation areas to explain the three pulses seen in the observed strong motion records in the near-fault region. The three areas are located close to asperities (zones of large slip) independently identified by Hikima and Koketsu (2007) using waveform inversion of strong motion data. However, the synthetic seismograms simulated with the two conjugate planes showed similar performance in comparison with the observed ground accelerations, velocities, and displacements. It seems to be difficult to judge the causative fault plane only from the empirical Green's function simulations.

Considering the relative locations of earthquake asperities to the hypocenter using picked traveltimes differences (Hikima and Koketsu, 2007) and the aftershock distribution observed by OBSs deployed in the source region (Shinohara et al., 2007), the most likely source model of the 2007 Chuetsu-oki earthquake consists of major slips on the main SE-dipping fault plane and minor slips on a small NW-dipping subplane near the hypocenter. The first and second strong motion generation areas in the most likely source model are located between the hypocenter and the K-K plant. The plant is not located in the forward rupture direction of the third strong motion generation area on the SE-dipping fault plane, but it is possible that the maximum S-wave motion due to the radiation pattern can occur in the direction of the plant. Furthermore, the high stress drop within the third compact area is also able to generate such pulse-like elementary waves at the K-K plant.