# Near-fault broadband ground motion simulations of the 2016 Meinong, Taiwan, earthquake and building damage analyses

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We perform near-fault broadband ground motion simulations of the 2016 Meinong, Taiwan, earthquake using the stochastic finite-fault modeling method into which we introduce the frequency-dependent radiation pattern of *S* waves. We simulate the broadband ground motions that recorded large velocity pulses using two hybrid approaches: the hybrid stochastic-mathematic approach and the hybrid stochastic-deterministic approach, and also simulate ground motions that did not record large velocity pulses using the pure stochastic method. The simulated ground motions using the hybrid stochastic-mathematic approach can reproduce observed large velocity pulses of both East–West (EW) and North–South (NS) components, and the simulated 5%-damped spectral accelerations have overall good fitting to the observation data. Due to the limitation of the velocity structure models in Western Taiwan, although the simulated ground motions using the hybrid stochastic-deterministic approach can show similar velocity pulse shapes to the observation data, the simulated peak velocities underestimate the amplitudes of observed velocity pulses of EW and/or NS components. The peak values and spectral contents of the simulated ground motions using the pure stochastic method fit well to the observation data. Through comparing the current ground motion prediction equations developed for shallow crustal earthquakes in Taiwan with both of the observed and simulated peak ground acceleration and spectral acceleration of the Meinong earthquake, we find that the ground motion prediction equations without the directivity correction term underestimate the spectral accelerations at periods around 1 s and longer for stations that recorded large velocity pulses. Finally we simulate strong ground motions at two collapsed building sites in the Tainan city where there were no observed ground motions and then perform seismic damage analyses using the simulated ground motions.

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