

# Ground Motion Simulations of Recent Major Earthquakes in Turkey

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## **Abstract**

Estimation of ground motions to which structures are exposed to during their lifetimes is the main step in earthquake-resistant design, retrofitting of the existing structures and reduction seismic risk. In regions with sparse or no seismic recordings, ground motion simulations are crucial. In this study, the stochastic finite-fault technique is used to simulate strong ground motions of the 1999 Marmara earthquakes. Ground motion simulations are carried out using regional model parameters as well as local soil conditions. For estimating the regional seismic model parameters such as stress drop, anelastic attenuation and duration, we employed the past recordings and the previous studies in the region. On the other hand, soil amplification factors to be used in ground motion simulations require special attention due to the uncertainties in soil response. In this study, we compare standard H/V ratios based on mainshock and aftershock recordings with several recent microtremor field measurements in the region. Finally, the region-specific seismic model parameters are calibrated against the strong ground motion recordings of the 1999 Marmara earthquakes. The results are expressed in terms of the simulated acceleration and velocity time histories, Fourier amplitude spectra and response spectra. Further simulations are performed for regions where there are not ground motion recordings and the distribution of ground motions is assessed.