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PHYSICS-BASED GROUND-MOTION SIMULATIONS FOR TEHRAN: RUPTURE DYNAMICS IN A HETEROGENEOUS EARTH CRUST

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The key element for performing seismic analysis of Structures is determining the seismic demands based on recorded earthquake ground motions. Since this key parameter is not available in many historically active seismic regions, using the earthquake simulations for achieving synthetic time histories is inevitable. In this study dynamic simulation of earthquake rupture is performed to generate time histories for Tehran, the capital of Iran. The fault being analyzed is the North Tehran fault which has produced earthquakes with magnitudes up to Mw7.5 before. The fault has a dip-slip mechanism which will be modeled by a mode-II crack in 2D-profile. The modeling considers various earthquake scenarios with fault embedded in a layered velocity-density model with constant or depth-dependent normal stress. Each scenario event is modeled with an initial random stress field that then generates a physically self-consistent complex rupture evolution, including heterogeneous slip, variable rise time (slip-rate function), and complicated rupture propagation. In first step for verification, results for ground motion parameters obtained from simulations are compared with those of ground motion prediction equations (GMPE). Then these results are used to assess the dark points of GMPEs.

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