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Earthquake Shaking Scenarios for the Application to Seismic Risk Management of Taipei Metro Area

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We present earthquake shaking scenarios by a physics-based ground-motion simulation scheme for seismic risk assessments. In fitting requirements of the application of loss estimations, scenarios can refer to various kinds of damage and losses to constructions (buildings, bridges, etc.), casualties, economic losses, social losses and so on. We quantitatively assess the ground motion effects by the physics-based full-waveform ground-motion simulation which is a powerful tool for earthquake-induced ground-motion prediction. The entire time history of the ground motion induced by an earthquake depends on a number of factors, including source-rupture process, subsurface velocity structure, topographic relief, and local site condition. Then, the further risk assessment can also be revealed by a combination with exposure data. As an example, we carried out simulations to model rupture scenario of the Shanchiao fault and the potential large subduction earthquake in northern Taiwan, with accounting for effects of (1) source slip distribution, (2) seismic wave propagation, (3) surface topography and (4) site amplification. Output ground-motion parameters, including peak ground acceleration (PGA), peak ground velocity (PGV), peak ground displacement (PGD), 0.3-s-period spectral acceleration (SA0.3), and 1.0-s-period spectral acceleration (SA1.0), can be adopted to further implement to loss estimation. Our results referred different shaking-level potentials of earthquake scenarios can benefit to risk management, especially for the further application of strategy making of emergency response and disaster prevention and preparations.