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Effect of local ridge topography on strong ground motion

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In this study, we implemented the curved grid finite-difference method to investigate the effect of local irregular topography on strong ground motion. The ground motions were simulated with different topographic irregularities in a three-dimensional homogeneous half-space. We focus on the topographic effect on strong ground motion with different topographic irregularities itself and different focal parameters including source model (a point source with different focal mechanisms and a finite fault) and the hypocentral location,. Our results show that: (1) Generally, topographic amplification is obvious in the areas with large slope, and increases with the slope. However, there are some special cases, which are not related to the focal mechanism, probably only affected by topography itself. (2) Topographic effect has different impact on three components of ground motions for different focal mechanisms. In general, the horizontal components are more affected by topography than the vertical component. (3) The position of maximum PGV varies with focal mechanism and frequency. It may appear in the side of the ridge opposite of the source rather than the top of ridge, which is probably affected by the interaction between incident waves and diffracted or scattered waves. (4) The ground motion characteristics are relatively more complex for a finite fault model. Besides the local topography, not only the fault geometry, but also the fault rupture process has a strong influence on the ground motions.