



Directionality of near-fault strong motion during Lushan Ms 7.0 earthquake

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We investigate the variation of near-fault ground motion with orientations, and its relationship with focal mechanism, fault distance and spatial location. Based on our analysis on Lushan earthquake, the following conclusions can be made: (1) near-fault strong motion shows distinct variation with orientation, indicating a clear maximum and minimum response direction. For all orientations, the largest acceleration response can exceed 4.0 times of the smallest. (2) the variation with orientation is significant at long period, while relatively small at short period with $T < 0.1$ s. Variation in intensity measures (IMs) with orientation increase with increasing period. The average maximum-to-minimum ratio increase from ~ 1.7 at 0.01 s to ~ 2.4 at 10.0 s. (3) Ground motion exhibits strong directionality within ~ 35 km from the fault, with maximum demand direction perpendicular to the fault strike. The orientation of maximum demand direction generally becomes random with the increase of fault distance. The characterization of directionality is correlated with the thrust faulting mechanism of Lushan earthquake, our results show that the effects of thrust-faulting are located in the region close to the fault, and become weak with increasing fault distance. Variations in intensity measures (IMs) decrease with the increase of fault distance, in the form of decreasing maximum-to-median and maximum-to-minimum ratio with increasing distance.