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Vertical and Horizontal Ground-Motion Prediction Equatioin for Taiwan

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A suitable attenuation equation can express the characteristics of the strong ground-motion attenuation for a region, and can be used to predict the ground-motion value of a specific site for seismic resistance design.
In this study, well processed strong ground-motion data from TSMIP in Taiwan are used to establish horizontal and vertical PGA and SA attenuation equations. A total of 60 earthquakes with 5968 records are selected and nonlinear mixed-effect model with maximum likelihood method is used to accomplish the regression analysis of ground-motion attenuation relationships for PGA and SA. From the analysis we can estimate ground-motion value with certain earthquake source, distance and site condition.
Strong motion data from Taiwan with at least 20 earthquakes recorded at each station are used to estimate the site and path effects on the standard deviation of empirical ground motion models. For PGA, the intra-event standard deviation of 0.54 ln units is separated into an inter-site term (0.238), an inter-path term (0.317), and the remaining aleatory variability. The inter-event standard deviation of 0.342 is separated into an inter-region term (0.177) and the remaining aleatory variability. Removing inter-site, inter-path, and inter-region terms, the aleatory standard deviation is 28% lower than the total standard deviation with the ergodic assumption. Models of the spatial correlation of the intra-event path terms and the inter-event source region terms are developed for PGA and spectral periods of 0.1, 0.3, 0.5, 1.0, 3.0, and 5.0 seconds.

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