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ABSTRACT

Ground Motion Prediction for Turkish Earthquakes

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The main result of this study is the development of a consistent set of empirical attenuation expressions for predicting free-field horizontal components of peak ground acceleration (PGA) and 5 percent damped pseudo acceleration response spectra (PSA) from 57 events that produced 112 strong ground motion records in Turkey. Precisely one-half of these records (56) have been recorded during earthquakes on various segments of the North Anatolian Fault, and more than a half of those have come from two major events in 1999.

The relationships for Turkey were derived in similar form to those previously developed by Boore et al. (1997) for shallow earthquakes in western North America. The used database was compiled for earthquakes in Turkey with moment magnitudes (Mw) $\geq$ 5 that occurred between 1976-2003, and consisted of horizontal peak ground acceleration and 5 percent damped response spectra of accelerograms recorded on three different site conditions classified as rock, soil and soft soil. The empirical equations for predicting strong ground motion were typically fit to the strong motion data set by applying nonlinear regression analysis according to both random horizontal components and maximum horizontal components. Comparisons of the results shows that ground motion relations for earthquakes in one region cannot be simply modified for use in engineering analyses in another region. Our results, patterned after the Boore et al. expressions and are further dominated by the Kocaeli and Düzce events in 1999, appear to underestimate predictions based on their curves for up to about 15 km. For larger distances the reverse holds.

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