Development of Horizontal Ground Motion Models for Shallow Crust Earthquakes and Subduction Earthquakes in Taiwan

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A new model to describe the median prediction and aleatory uncertainty (probability density function shape) of horizontal ground motion for shallow crust earthquake and subduction earthquake in Taiwan are developed in this study. The maximum-likelihood approach is used as the regression tool to determine the model parameters to consider the correlation of record residuals within the same event and site. The orientation-independent horizontal component RotD50 defined by David M. Boore is used as ground motion intensity measurement to develop the ground motion model.

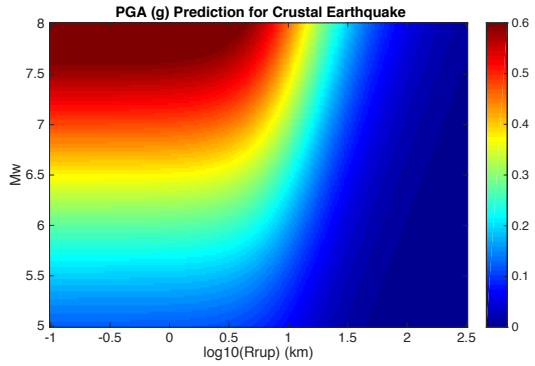

Fig. 1. PGA Prediction for Crustal Earthquake

The ground motion model includes several predictors to describe the earthquake source (such as focal depth, dip angle and focal mechanism), the path from source to site (closest distance to rupture plane and hanging wall effect), the site condition (Vs30 and Z1.0) to predict the median ground motion more accurately. The total residual term is separated into event-specific term, site-specific term and record-specific term to develop the single station sigma model. The statistical uncertainty of the model prediction is also established to capture the epistemic uncertainty of the ground motion model. The new ground motion model will be useful to conduct the site-specific probability seismic hazard analysis in Taiwan.

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