

Seismic hazard analysis for East Malaysia; based on a proposed ground motion prediction equation

ABSTRACT

The seismic hazard analysis requires an estimation of ground motion intensity where the process needs to use a compatible ground motion prediction equation or GMPE, which provides ground acceleration estimates in a function of earthquake magnitude and distance. Hence, the effect of current equation often does not accurately represent the earthquake condition in East Malaysia region. In this study, the characteristics of low-to-moderate databases were used and derived by regression analysis in terms of horizontal peak ground acceleration (PGA). The appropriate GMPE design for East Malaysia is based on the ground motion records compiled from strike slip earthquakes that occurred within 10 to 1,350 km. This earthquake data is based on actual data recorded at a broad range of magnitude levels within a wide range of distances. The new equation is used to predict the PGA value throughout East Malaysia by probabilistic method. PSHA is a method to analyse seismic hazard assessment using probability concept by considering the uncertainties of the size, location and rate of occurrence of earthquake and the variation of ground motion characteristics. The four well-known existing attenuation functions are evaluated with current equation to highlight their limitations in magnitude and distance. With a more complete collection of earthquake databases, GMPE has become more reliable. The GMPE of peak ground acceleration for low-to-moderate earthquake at long distance was found to be logarithmically distributed. The equation provides ease in both implementation and interpretation of physical parameters with a comparable standard deviation.