



AN UPDATED GROUND-MOTION PREDICTION EQUATION FOR TAIWAN INCORPORATING GROUND-MOTION SIMULATION

Po-Shen Lin¹, Yen-Tung Yen², Pao-Shan Hsieh³, Kuo-Shih Shao⁴, Chin-Tung Cheng⁵ and
Yuan-Chieh Wu⁶

Ground-Motion Prediction Equation (GMPE) has been widely used in probabilistic seismic hazard analysis (PSHA) for estimating ground-motion value and its variability when given an independent variable (magnitude, distance, V_{s30}). Most GMPEs have been derived from regression analysis using large sets of observed data called empirical GMPEs. For a regional GMPE model, it may lack large magnitude and near field data which may cause bias of the predictions.

Strong-motion instruments have been in place in Taiwan since 1991 and they have produced a large amount of observable data, including the most valuable data from the 1999 Chi-Chi earthquake, but data for earthquakes with a magnitude greater than 6.5 is still lacking. Recent development of physics-based numerical simulations of earthquakes has been greatly improved by taking into account the source, path, and site effects. This may help to further improve the development of GMPEs.

In this study, we will use a hybrid method to simulate broadband ground motions by combining deterministic ground motion predictions for long periods (longer than 1 second) with stochastic predictions for short periods. A large number of simulations will be performed to generate the lack part of the observed data. With the combination of observed data and simulated data we will be better able to re-evaluate the current GMPEs in Taiwan. Finally, we will have an updated version of GMPEs which will have more accurate predictions of ground-motion value for near field and large magnitude earthquakes.

¹ Senior Researcher, Sinotech Engineering Consultants, Inc., Taipei, Taiwan, person@sinotech.org.tw

² Associate Researcher, Sinotech Engineering Consultants, Inc., Taipei, Taiwan, ytyen@sinotech.org.tw

³ Associate Researcher, Sinotech Engineering Consultants, Inc., Taipei, Taiwan, bowmei@sinotech.org.tw

⁴ Senior Researcher, Sinotech Engineering Consultants, Inc., Taipei, Taiwan, sks@sinotech.org.tw

⁵ Principal Researcher, Sinotech Engineering Consultants, Inc., Taipei, Taiwan, ctcheng@sinotech.org.tw

⁶ Associate Researcher, Institute of Nuclear Energy Research, Taoyuan, Taiwan, ycwu@iner.gov.tw