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Arias Intensity Attenuation Relationship with Considering Vs30

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Arias Intensity is a ground-motion parameter that captures the potential destructiveness of an earthquake as the integral of the square of acceleration time history. It obtains more reliable prediction of the level of anticipated damage than other ground-motion parameters by incorporating amplitude, frequency content, and duration of strong ground-motion. It correlates well with several commonly used demand measure of structural performance, liquefaction, and seismic slope stability. A new empirical relationship for crustal earthquake is developed to estimate Arias Intensity as a function of magnitude, distance, fault mechanism, and continuous site variable - Vs30. It is based on strong-motion data from TSMIP array in Taiwan.

Its functional form is derived from the point-source model, and the coefficients are determined through non-linear regression analyses using a mixed-effects model. The results show that Vs30 can reduce the regression error significantly. The Arias Intensity value predicted by the present study is similar with that of Travasarou et al. (2003) in general; the value predicted by the present study is slightly higher in the near distance (<40$\tilde{7}$0 km) and is lower in the far distance (>40$\tilde{7}$0 km). The total standard deviation of regression error in this study is 0.994 (in ln unit), which is much smaller than that of most other previous studies.