台灣東北部隱沒帶地震地動預估式之進一步研究

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摘要

地動預估式是地震危害度分析中重要的一環。由於地動預估式得到之標準差大小對於地震危害度之評估有直接的影響，使用過大的標準差會使工程設計有過於保守的可能。此外，隱沒帶地震與一般淺部地殼地震特性之不同，在分析地震危害時也必須加以考量，因此得到具有合理標準差之適當隱沒帶地震衰減式十分重要。隱沒帶地震又可以分為板塊界面型地震以及板塊內部型地震，兩者之衰減特性以及反應譜型亦有所不同，若將兩者之地震資料一起回歸，成果會同時混合了界面型地震與內部型地震之特性，同時也會使標準差增加，而有分別回歸之必要。本研究使用中央氣象局自由場強地動觀測網計畫(TSMIP)蒐集之台灣地區隱沒帶板塊界面型及板塊內部型地震的強震資料，使用混合效應模型並以最大概似法做回歸分析，分別建立能代表兩型震源的最大水平加速度與反應譜加速度衰減式，期能區分這兩種類型地震之地動及反應譜差異並期能降低地動預估式之標準差。

Further studies on ground-motion prediction equations for subduction-zone earthquakes in Northeast Taiwan

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Abstract

The ground-motion prediction equation (GMPE) is an important part of probabilistic seismic hazard analysis (PSHA), the value of GMPE sigma (standard deviation) affects the hazard analysis directly. The larger sigma, the greater hazard. In addition, the differences between crustal earthquakes and subduction zone earthquakes should be taken into consideration, therefore we need to build a proper GMPE with reasonable sigma for subduction zone earthquakes. Subduction zone earthquakes involves interface earthquakes and intraslab earthquakes, two types of earthquakes have different attenuation characteristics and response spectrum shapes. If we combined two types of earthquakes in the regression analysis, the results will mixed the characteristics of two kinds of earthquakes and therefore enlarge the sigma. Thus, in this study, we establish separate ground-motion relationships for interface earthquakes and intraslab earthquakes by using the data from Taiwan Strong-Motion Instrumentation Program (TSMIP), and the coefficients of the equation are determined through non-linear regression analysis using maximum likelihood method (MLE) and mixed-effects model. The results are expected to be valuable in the distinction for interface and intraslab earthquakes characteristics and the reduction of GMPE sigma.