Application of Bayesian Probabilistic Approach on Ground Motion Attenuation Relations

by

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Approved by

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Date
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Ground motion estimation is an important part of engineering seismology. Although the attenuation relationships can predict ground motion intensity with small number of the parameterized information, the scatter of the data from the relationship is large. This means the need of revision of the attenuation model for more accurate prediction. However, the more effective estimation relationship do not mean the more complicated functional form since a predictive model with too many free parameters may induce over-fitting.

Recently, Bayesian probabilistic approach captures great interest. Bayesian statistical inference using probability logic provides a rigorous solution to parametric identification and uncertainty quantification and can propose a plausible model class which takes into account the robustness and data fitting capability simultaneously. Therefore, it offers an efficient approach to deal with regression analysis and to select the most plausible model class among a set of model class candidates based on measured data.

In this thesis, Bayesian probabilistic approach is utilized and applied to the estimation of seismic attenuation relationship. Application of the proposed method on peak ground acceleration estimation is presented, which investigates the complexity of the empirical Boore-Joyner-Fumal attenuation formula and the homogeneity assumption of the prediction-error variance based on a database of strong ground motion records of China.
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