

**Application of Bayesian Probabilistic Approach on
Ground Motion Attenuation Relations**

by

Rong-Rong Xu

Master of Science in Civil Engineering

August 2013



**Faculty of Science and Technology
University of Macau**

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A thesis submitted in partial fulfillment of the
requirements for the degree of

Master of Science in Civil Engineering

Faculty of Science and Technology
University of Macau

2013

Approved by

Supervisor

Date

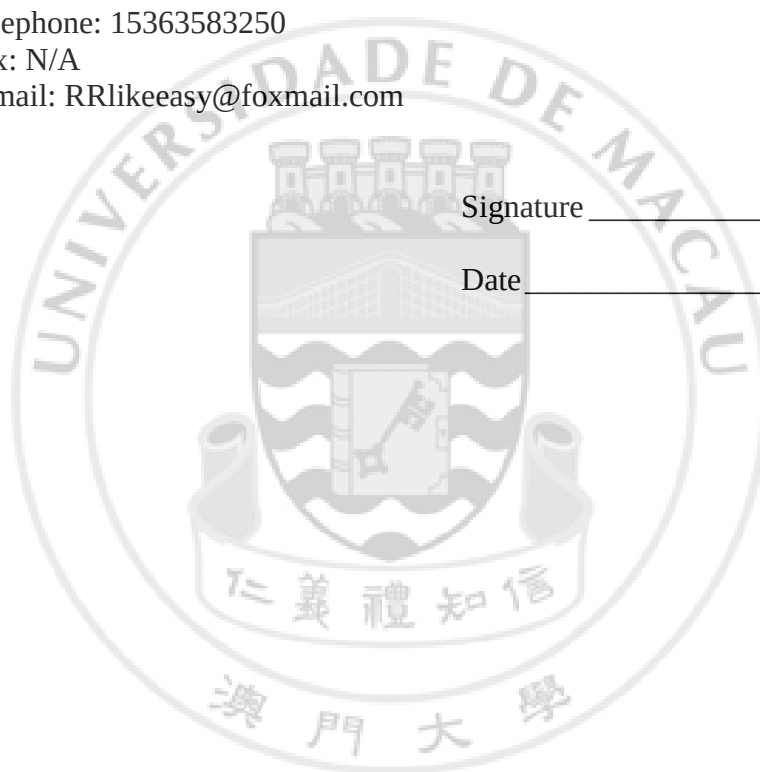
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Address:

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Fax: N/A

E-mail: RRlikeeasy@foxmail.com



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Abstract

APPLICATION OF BAYESIAN PROBABILISTIC APPROACH
ON GROUND MOTION ATTENUATION RELATIONS

by Rong-Rong Xu

Thesis Supervisor: Prof. Ka-Veng Yuen
Master of Science in Civil Engineering

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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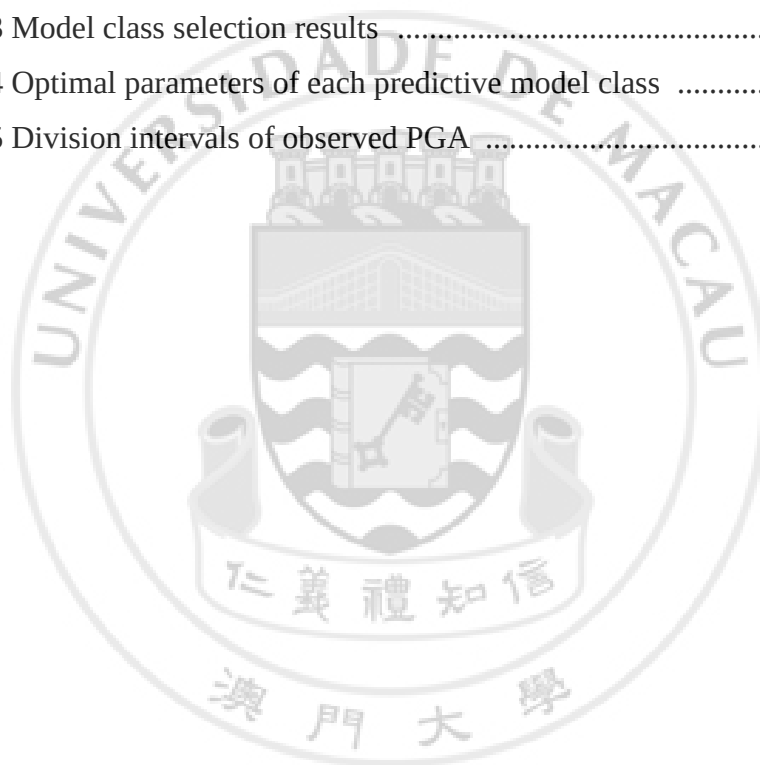
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ACKNOWLEDGMENTS

I would like to extend my sincerest thanks my advisor, Prof. Ka-Veng Yuen, for his instructive suggestions throughout my study at the University of Macau and his illuminating instruction in the completion of this thesis. I would also like to thank my examination committee members: Dr. I.T. Ng, Dr. C.C. Lam and Dr. W.H. Zhou.

I also would like to express great gratitude to Prof. K.P. Kou, Prof. G. K. Er, Prof. W.M. Quach, Dr. C.C. Lam, Dr. I.T. Ng and Dr. W.H. Zhou for their patient instruction and guidance throughout the course of my study.

I am also deeply grateful to the scholarship support from the University of Macau during my period of study.

I would like to thank my schoolfellows at UM. First, I deeply thank Mu Heqing, Kuok Sin Chi, Tan Fang, Zhang Lizhi, and Liang Pengpei. They are members of Prof. Yuen's research group who came to CEE earlier than me and gave me a lot of academic assistances. It is memorable to me to study with Li Chen, Wang Wei, Zhao Linshuang, Zhou Huan, Cui Yan, Wang Kun, Wu Shengshen, Xie Langkun, Wang Xuan, Xie Yidong and Li Xiaobo. Because of them, the time of my graduate program is more colorful and precious. I also thank Tou Ka Man, Guo Xiuxiu, Yang Yang, Wang Dong, Cao Hangyu, Li Jiantao, Lin Zhansheng, Dong Le, Tang Zhe, Tu Shuai, Fang Yizhi, Du Haien, Xu Xu, Lu Yanan and Lai Xiangang, for their great friendship.

Special thanks are presented to my dear precious friends Qin Yi, Rong Ying, Wei Xiaohua, Guo Min, Li Zan, Huang Tingzhu, Su Siyan, and Chen Jixiu. It is a privilege to have your friendship which will last forever.

Last, but definitely not least, I sincerely thank my dear parents, who give birth to me and bring me up, for their love, encouragement and support. I could not have accomplished this without them and I dedicate this thesis to them.