

**Modeling of Seismic Ground Motions and Random  
Vibration Analysis of Some Structures Excited by  
the Ground Motions**

By

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**Abstract**

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In this thesis, the power spectral density functions of the real ground acceleration caused by earthquake are modeled with the moving average method and digital filter. Several models for the regression of the power spectrum function are tested and analyzed and then the improved Kanai-Tajimi model is proposed and used for modeling power spectrums of the ground acceleration records. To testify the feasibility and effectiveness of the improved Kanai-Tajimi model, some numerical spectrum analyses on several real data records of the ground acceleration in different areas are carried out, followed by some numerical structural analysis excited by a real earthquake to show the different effects of the improved Kanai-Tajimi model in system responses.

**Key Words:** Earthquake, Regression, Power spectrum, Model, Structural random vibration analysis

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