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Abstract
This thesis is a research of the active vibration control based on neural networks to suppress the vertical vibration of a traditional passive vibration isolation system without and with significant disturbance respectively. In first condition, the object of active control is to reduce the vertical resonant vibration at natural frequency of the passive system, but in second condition it is the vertical vibration induced by the disturbance. First, the neural network theory is described and the physical mechanism of active vibration control is studied based on the theoretical equations which govern the system vibration. Next, computer simulation investigations are performed to verify the aforementioned theoretical model and to look into the possible performance of active vibration control based on neural networks using feedback control and feedforward control respectively in previous mentioned conditions. Finally, this thesis carries out the experiment and results show the vertical resonant vibration at natural frequency can be reduced about 18 dB using feedback control in first condition. Moreover, the vertical vibration induced by the single frequency disturbance can be reduced about 29 dB, and that by the wide band disturbance can be reduced about 10~20 dB using feedforward control in second condition. The experiment results show that the proposed method can achieve great efficiency.
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