

第二十六屆中華民國力學學會年會暨全國力學會議
December 2002

Hybrid Robust Vibration Controller for Isolation Platforms with DSP Implementation

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Abstract

In this paper, a hybrid robust active vibration controller is proposed for reducing single-degree-of-freedom (SDOF) and multiple-degrees-of-freedom (MDOF) isolation platforms vibration. The controller combines adaptive feedforward with filtered-x least mean squares (FXLMS) algorithm and robust controller using H_{∞} synthesis theory for obtaining the desired robust performance and fast convergence. The control plant configurations are identified by a frequency-domain technique and implemented by using a floating-point digital signal processor (DSP). Experiments are carried out to evaluate and compare the performance of feedforward control, feedback control and proposed hybrid controller for reducing the vibration at two test isolation platforms. The results of experiment indicate that the proposed hybrid technique is effective in reducing the vibration and yield the best performance for the test isolation platform systems. The comparisons of three control structures also are described in this paper.

Key words : DSP; SDOF; MDOF; FXLMS