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Vibration Isolation for Engine Mount Systems Using Active Hybrid Robust Controller

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Abstract

In this paper, a hybrid robust controller is proposed for reducing vibration on single input/single output (SISO) and multiple input/multiple output (MIMO) engine mount systems. The controller is designed to achieve robust stability and fast convergence by using a combination of the filtered-x least mean squares (FXLMS) and H ∞ robust control methods. Plant response is identified by a frequency-domain technique and implemented on a floating-point digital signal processor. Experiments are carried out to evaluate and compare the performance of feedforward control, feedback control and the proposed hybrid control for reducing vibration of two test engine mounts. The results show that the proposed hybrid technique is effective in reducing the vibration and, for the cases compared, results in the best performance for SISO and MIMO engine mount systems.

Key words：Vibration isolation; Digital signal processor; DSP; Hybrid robust controller; Active control; Vibration reduction; Vehicle vibration; Frequency domain; Robust control; Engine mounting; Hybrid control