

Experimental Investigation of Active Vibration Control for Gear Set Shaft

Wu, Jian-Da; Lin, Jia-Hong

Abstract

In this study, three different active vibration control (AVC) algorithms are implemented and compared in the experimental investigation of gear set shaft vibration control. Apart from feedforward and feedback control system, a hybrid controller is proposed, which is a combination of the adaptive control with filtered-x least mean squares (FXLMS) algorithm and feedback structure with robust synthesis theory for obtaining the fast convergence and good robust performance. The control plant configuration is identified by the frequency domain technique and implemented by using a digital signal processor (DSP). Experiments are carried out to evaluate the vibration attenuation performance of three control systems at gear set shaft. The results of the experiment indicate that the hybrid technique is effective in reducing the vibration and yield the best performance in experimental investigation. The experimental comparison and analysis of the proposed controllers are also described in this paper.

Key words : Active vibration control; Gear set shaft; Hybrid control; Digital signal processor; DSP; Shaft vibration control; Adaptive control; Least mean squares; Feedback control; Robust synthesis; Vibration attenuation; Vehicle vibration