

Implementation of Adaptive Harmonic Noise Controller for Engine Exhaust
System with Frequency Multiplier Circuit

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Abstract

A novel active noise control (ANC) technique using adaptive frequency multiplier circuit for blade passing frequency (BPF) noise of centrifugal fan and harmonic noise of engine exhaust system is proposed. The proposed ANC system is based on the well-known adaptive controller with filtered-x least-mean-square (FXLMS) using variable step size convergence technique. The proposed controller is realised on finite impulse response (FIR) filter and implemented by using a TMS320C32 digital signal processor (DSP) with reference signal from optical fibre sensor and frequency multiplier circuit. Experiments are carried out to evaluate the noise attenuation of the proposed ANC system for centrifugal fan and engine exhaust system. The experimental results indicate that the frequency multiplier circuit could improve the performance in reducing the noise at the BPF of centrifugal fan and periodic noise of exhaust system.

Key words : Acoustics; Active noise control; Blade passing frequency; Engine exhaust system; Centrifugal fan; Internal combustion engine