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Development of a Multiple Channel Active Noise Cancellation System for Car Cabins

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Abstract

This paper describes the development of a multiple-channel active noise cancellation system for car cabins. Various active techniques are compared in terms of control structures and control algorithms. The filtered-x least-mean-square algorithm with synthetic reference and the linear quadratic gaussian control are employed for controller synthesis. Feedback, feedforward and hybrid configurations are adopted as the major control structures. The plant model is identified using a frequency-domain method. The controllers are implemented by using a digital signal processor. Experiments are carried out to evaluate the proposed techniques for attenuation of the internal field in a car cabin. The experimental results indicate that the hybrid control structure yields the best performance in terms of noise attenuation and convergence speed.

Key words：Acoustics; Active noise control; Car cabin; DSP