Development of the propagation paths and deriving observer of feedforward active noise control system by using state-space formulation

ABSTRACT

This paper presents the derivation and simulation of the propagation paths of a feedforward active noise control (ANC) system in one dimensional free-field medium using state-space model (SSM) instead of Finite Impulse Response (FIR) model. Furthermore, a new observer namely State Space Least Mean Square (SSLMS) observer will be derived. This observer will be used to estimate the states along the propagation path which can not be estimated using LMS algorithm because LMS based on the FIR models. The system is simulated in MATLAB and the results of the pressure modes along the noise path are depicted and have shown that the level of the acoustic signal decreases gradually against the modes. The results of the novel observer to show the comparison of the tracking the pressures of three modes along the interfering region between the primary and secondary path are shown with the mode which is located at the observer achieving accurate estimation.

Keyword: Active noise control; State-space model; SSLMS observer; States estimation