Active Noise Control in Ventilation Ducts Using the LMS Algorithm

Song, Xinle (School: YK Pao School)

There is a variety of ventilation ducts in our lives, of which the fluid flow will produce noise that is unfavorable to people's physical and mental health. This project is aiming to develop an Feed-Back Active Noise Control system for ventilation ducts, that are more effective with low-frequency noises, than the Traditional Non-Feedback ANC System. The physical model of the ventilation duct is built after testing the feasibility of the LMS Algorithm in Simulink. The data of noise level when the ANC System is turned on and off is being measured and analyzed by a noise level meter. The test was repeated to test the performance of the ANC for different noise frequencies. Compared with the Traditional Non-Feedback ANC System (average reduction of 0.75 dB of noise for noise from 200-350Hz, ranging from -3.6 to 4.7 dB), the Feed-back LMS ANC System (under step size = 0.01), cancels out an average of 4.75 dB (ranging from 1.4 to 9.7dB) of noise from 200-350Hz. This project shows that the implementation of the Feed-Back System in the ANC system in ventilation ducts has better performance than the traditional Non-Feedback Method. Further experiments could be done by implementing the Filtered-X LMS Algorithm and Variable Step Size to improve ANC performance.

Awards Won: