Active Control of Harmonic Noise Propagated through Ventilation Openings of Enclosures Using an FIR Filter

Jung-Mo Koo, Chinsuk Hong, Weui-Bong Jeong, Sumin Ji, Tae-Hoon Kim
Room 513, #10 Engineering Building, Busan National Univ., Jangjeon 2-dong, Geumjeong-gu, Busan, Korea

cshong@uc.ac.kr

Abstract. Harmonic noise generated by a primary source in an enclosure and transmitted out of it through the ventilation windows is actively controlled. The active control system is implemented based on the feedforward FIR filter for minimization of sound power radiation through the ventilation windows. It is essential to resolve the causality issue for the implementation of the FIR filter especially when the fundamental frequency and its harmonics are not coincident with the frequency resolution of the filter. The causal filter can be achieved by rearranging the filter coefficients but it leads to the delay of half length of the filter. Design of the FIR filter is firstly performed with measurements of transfer functions for the primary path and the secondary path. The compensation of the delay under the consideration of the causality is then achieved with the additional delay method presented in this paper. The design of the active control system using the FIR filter with the causal delay compensation is validated experimentally. The control performance is measured about 10~18dB in reduction of the Sound power at the 120Hz, 200Hz, 300Hz. It is concluded that feedforward active control system based on FIR filter is successfully implemented with resolving the causal delay compensation.