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Study of the effects of geometrical parameters on noise reduction in a simple expansion chamber muffler with extended inlet and outlet tubes

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Abstract

In this paper, the effects of geometrical parameters in a simple expansion compartment with input and output tubes on its acoustic damping performance are studied by analytical and numerical method. In analytical model, the Transfer Matrix Method (TMM), and in numerical model, the Finite Element Method (FEM) are utilized to study the effective parameters. These effects include parameters such as extending the inlet and outlet tubes into the expansion chamber and increasing their lengths, changing the position of the input and output tubes, adding holes and varing their diameters and their numbers in the chamber. The results show that the performance of the audio damping improves by adding segmentation and increasing length. It can also be found that by adding holes. Into the pit and increasing their numbers, the frequency associated with the peak of acoustic damping is increased. Therefore, they can be used to improve the design of muffler in the desired frequency range.

Keywords: Muffler, Sound transmission loss, Transfer matrix method, FEM.

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