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Modeling and simulation of the acoustic behavior of a muffler in a passenger car exhaust system

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Abstract

Muffler is one of the main components of an automotive exhaust system, which reduces the noise of the exhaust system. In this paper, modeling and simulation of the acoustic behavior of a muffler is presented with the aid of an engineering software. For this purpose, firstly, an analytical model is presented to evaluate the sound transmission loss in cylindrical shells based on Sander's theory. Then, catalytic converter and muffler are modeled by considering the model's major dimensions in the engineering software. The comparison of the present results with previous studies shows the accuracy of the analytical model as well as the simulation results. In addition, the contour of sound pressure inside the catalytic converter and the muffler, as well as the direction of the exhaust gas flow inside the muffler, indicate that the sound level created by Muffler is in the safe range according to the limitations posed by the standards.

Keywords: Muffler, Acoustic behavior, Sound pressure, Sound energy.

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