

Investigation of sound insulations effects on acoustic behavior of automotive cavity components using Energy Statistical Analysis method

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Abstract

In this paper, the use of sound insulations in the acoustic behavior of an automotive cavity compartments is investigated by the aid of numerical simulation based on Energy Statistical Analysis method. Therefore, at the first stage the governing equations for the Statistical Energy Analysis are presented. Then, all subsystems including the internal and external cavities of the car body and also connections between all components, are modeled. By accounting for all the sound sources in the model, the effects of using porous materials on sound transmission loss on the main components of the car body, including the roof, floor and dashboard panels are investigated. The validated results show the accuracy of the present model. Also, the results indicate that the use of porous sound insulators improve the noise transmitted to the automotive cavity, particularly at high frequencies. On the other hand, they demonstrate that the effects of employing these materials on the roof panel are more significant than the other parts of the car.

Keywords: Energy statistical analysis, Sound transmission, Porous layer, Sound insulation.

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