

Sound Prediction of an automotive HVAC using Noise Synthesis Technology

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Abstract:

The paper describes a methodology for the HVAC sound prediction, based on virtual acoustic prototyping and Noise synthesis Technology (NST) approach. NST is a specific product-dependent technology that consists, starting from the vibroacoustic scheme of the object, in splitting a noise generating system into several components. Each component, qualified as a source and/or as a transmission path, can be characterised using data provided by measurements and/or computation or found in the acoustic literature. The prediction of the product sound is done using the multi-task software tool Equip+.

The investigated components of the HVAC system are the squirrel-cage air blower, the heat-exchanger and the butterfly-valve, some of them being at the same time source and transmission paths, as the heat exchanger. Sources are defined by their sound power level spectrum and transmission paths are characterised by their transmission loss spectrum.

The paper presents the description of each component of the model, and the formulations chosen.

The objective of the model is to predict the sound level radiated by the system as well as some psychoacoustic criteria. It will allow to predict the influence of selected parameters on global perception. Some examples of influence will be shown in the paper.

In order to validate the model's results, sound power measurements are performed on a HVAC prototype containing only the investigated components.

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