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Title: The relevance of artificial heads in test based and numerical scenarios

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Abstract:

As building physical prototypes for testing purposes is cost- and time-intensive, the role of simulation becomes more and more important in the development process in almost any industry branch. As part of this trend, the simulation of NVH problems is also growing rapidly. Apart from that, the application of artificial heads for the test-based investigation of NVH problems has been established for many years.

This work investigates the influence of an artificial head on the sound field inside of a vehicle cabin - especially at the driver's ears positions - by application of FE-based simulation. Thereby it outlines the relevance of the use of artificial heads in test based and numerical scenarios. Using the artificial head, two effects can be observed which resemble the effects of a human driver on the perception of acoustics inside the car cabin: directivity, which is mainly characterized by the head, ear and torso geometry as well as a modification of the cabin room modes.

A numerical model of the artificial head is built and validated on behalf of measurements under free field conditions. It is then integrated into a fully equipped car model and the resulting simulation output is compared to measurements in a matching test car. As one of many possible real application scenarios from the automotive industry, a psychoacoustic analysis of simulated and measured data is performed to show the capabilities of binaural simulation results.

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