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Vehicle Interior Noise – A Combination of Sound, Vibration and Interactivity

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ABSTRACT

Human beings receive the surrounding world via different senses. Interaction phenomena are expected in the context of sound and vibration. In fact, the evaluation of acoustical comfort in a vehicle cannot be achieved with an isolated consideration of only the airborne noise. A passenger must be regarded as part of a vibro-acoustic system in which the coupling with the vehicle occurs via the contact points of the steering wheel, seat, floor panel and pedals. Within this context, and in times of advanced acoustical engineering resulting in quiet vehicles with low interior sound pressure levels, vibrations can become more important. The impact of combined sound and vibration stimuli on subjective evaluations has not yet been fully clarified. In the following, explorative studies about different test situations and their influence on evaluation results are presented. Test subjects were asked to evaluate sound, or vibration, or both, with respect to their quality in different test situations. Different test settings were considered: real vehicle drive, noise and vibration reproduction in a driving simulator, and noise playback in a listening room. The tests provided information about the interaction of sound and vibration, and about the importance of other aspects such as context and interactivity.