Chair of Structural Mechanics
TUM School of Engineering and Design
Technical University of Munich

Final thesis in Cooperation with AUDI AG

Examination of the vibro-acoustic transmission and the influence of the AVAS loudspeaker into the passenger compartment

Motivation

Electric cars are very quiet especially at lower speeds due to the missing combustion engine. In order to maintain the safety of pedestrians, a great number of countries enacted laws to force the car manufactures to install an artificial sound. This sound is known as the “Acoustic Vehicle Alerting System” (AVAS). Those artificial sounds are emitted via loudspeakers and need to fulfil certain sound pressure levels (SPL) in certain frequency ranges.

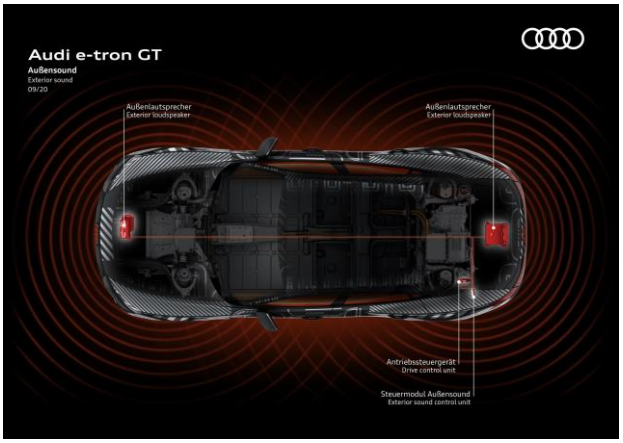

Fig. 1: Example, AVAS, e-tron GT

To consider the impact of the sound into the passenger compartment, measurements of the vibro-acoustic paths are planned. For this, the impact of the loudspeaker into the body needs to be analysed. To accomplish that, different methods of performing a transfer path analysis are to be compared (Blocked Forces, Mount Stiffness, OPAX).

Tasks:

- Familiarization of transfer path analysis and its methods (Blocked Forces, Mount Stiffness, OPAX)
- Development of a measurement setup
- Measurements of the vibro-acoustic transmission from the AVAS loudspeaker into the passenger compartment of a car
- Evaluation and identification of the relevant paths
- Comparison of the different methods of the transfer path analysis

Expertise:

- Basics of technical acoustics
- Basics of examination of acoustic measurements (e.g. FFT)
- Language of the thesis: German or English

Tutor at TUM:

- Nils Schönfeld (Room N1152), nils.schoenfeld@tum.de

Literature:

- Dr. Stephan Gsell, Micheal Werner. AAC 2019 - Proceedings, Development of AVAS sounds at Audi. Aachener Akustik Kolloquium, 25.11.2019 - 27.11.2019. https://www.aachen-acousticscolloquium.com/en/conference-documents/.
- AUDI Mediacenter, e-tron GT, https://www.audi-mediacenter.com/de/hightech-trifft-handarbeitdie-produktion-des-audi-e-tron-gt-in-den-boellinger-hoefen-13242/kreativitaet-und-klassische-ingenieursarbeit-der-e-sound-des-audi-e-tron-gt-13246