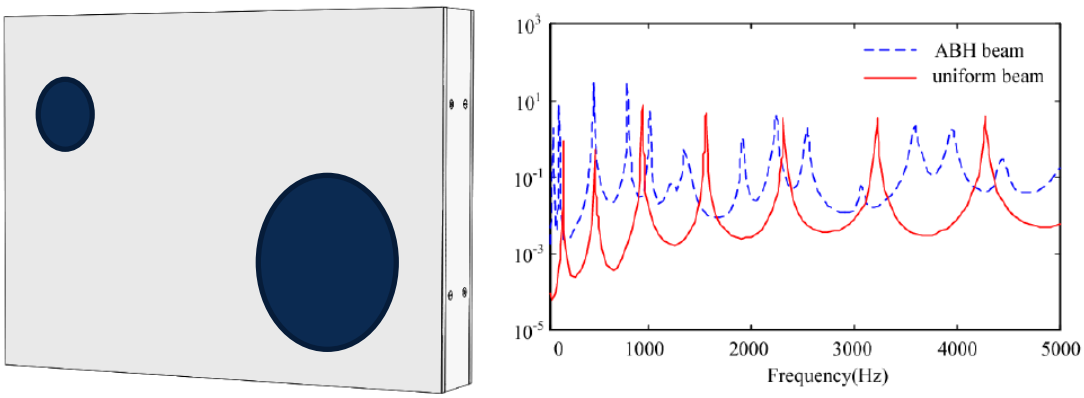
TECHNISCHE UNIVERSITÄT DRESDEN

Fakultät Elektrotechnik und Informationstechnik, Lehrstuhl für Akustik und Haptik

Diplomarbeit

Topic: Investigating the acoustic black hole applications for room acoustics



Acoustic black holes (ABH) have been successfully employed for controlling noise and vibrations in mechanical structures. An acoustic black hole is a power-law tapered profile on a structure to decrease velocities of wave propagation to minimum levels.

In rooms, high-frequency sounds can easily be reduced by curtains, interior furniture or dedicated sound absorption treatment with a relatively low amount of material. On the other hand, big obstacles / structures / material thicknesses are required to absorb low frequencies. Even though membrane absorbers are commonly used to absorb such low-frequency sounds, their efficient frequency bandwidth is very narrow. Therefore, the Distributed Mode Absorber (DMA) concept has been proposed.

DMA prototypes are developed with improved membranes; such that absorption can be achieved over a wider range of frequencies using rigid front panels. The proposed thesis (Diplomarbeit) will investigate the application of ABHs into the front panels of DMAs. The topic includes vibro-acoustical modelling as well as measurements of DMA prototypes with ABHs with several design parameters, i.e., front panel material and back volumes.

The following points can be defined as the milestones of the topic:

- Performing a literature survey on ABHs
- Modelling vibro-acoustic behavior of DMAs with ABH using BEM/FEM software
- Optimizing the geometrical dimension and locations of ABHs
- Validating the prototypes with vibration measurements and sound absorption measurements

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