

Bachelor/Seminar/Master Project

Fine-Tuning the Vibroacoustic FEM Simulation of a Thin-Walled Duct System

Motivation

The through-wall sound transmission of fan duct systems is governed by the vibroacoustic properties of the mechanical structures. The numerical simulation of such (usually thin-walled) structures faces several hurdles, e.g., locking effects, pre-stresses, varying junction conditions, and the definition of the material parameters. These effects can be considered in a FEM model using different techniques that are readily available in our FEM code openCFS. This work deals with the fine-tuning of the FEM settings in an optimization task, aiming to bring up an accurate model that avoids unnecessary computational overhead and fits the available acoustic measurements.

Tasks

- Perform a mesh-refinement study on an existing Vibroacoustic FEM simulation
- Extend the FEM simulation to consider different effects in the mechanical structure
- Perform an optimization w.r.t. the model settings
- Evaluate the impact of different extensions w.r.t the computational cost

Research Questions

Which effects are required to take into account to model the sound radiation accurately?
Which effects can be neglected for the sake of computational efficiency?

Organisation

- **Language:** English preferred, German possible
- **Start:** immediately possible
- **Duration:** 2 Semesters maximum

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