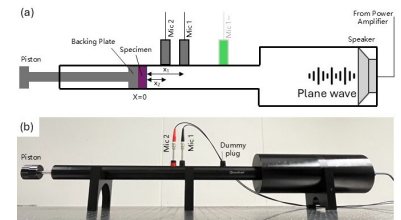


Bachelor-, Masterthesis

Uncertainties in Impedance Tube Sound Absorption Measurements

Topic

Acoustic metamaterials provide innovative solutions for sound absorption, particularly at low frequencies. While their acoustic properties are often simulated, experimental measurements frequently lack uncertainty quantification. Understanding the reproducibility of these measurements is crucial for ensuring reliable performance in practical applications.



This thesis aims to assess the reproducibility of sound absorption measurements in 3D-printed acoustic metamaterial designs. The investigation will be conducted using an impedance tube setup. The study will analyze the variation in measurement results across different mounting conditions and multiple samples of the same nominal design. Furthermore, discrepancies between theoretical predictions and experimental resonance frequencies will be evaluated.

Tasks

- Conduct literature research on acoustic metamaterials and measurement reproducibility.
- Perform experimental measurements using impedance tubes.
- Analyze the variability of sound absorption results across different mounting conditions.
- Compare measurement results of multiple nominally identical samples.
- Investigate the impact of 3D printing inhomogeneities on acoustic performance.
- Evaluate deviations between theoretical and experimental resonance frequencies.
- Document findings and provide recommendations for improving measurement accuracy.

Requirements

- Background in acoustics, mechanical engineering, or related fields.
- Interest in 3D printing and material characterization.
- Analytical and structured approach to data evaluation.
- Knowledge in CAD modeling.

Contact

Technische Universität München
Lehrstuhl für Akustik mobiler Systeme
Mert Dogu, M. Sc.
Boltzmannstraße 15, 85748 Garching b. München
Tel. +49 (89) 289 - 55134
mert.dogu@tum.de
<https://www.epc.ed.tum.de/vib/mitarbeiterinnen-und-mitarbeiter/mert-dogu/>