Chair of Vibroacoustics of Vehicles and Machines
School of Engineering and Design
Technical University of Munich

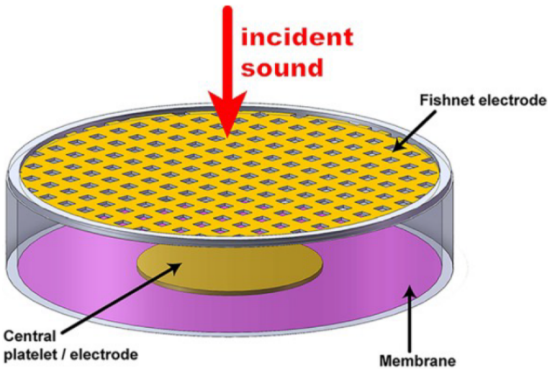
Master's Thesis

Design, Modeling, and Experimental Validation of Passive Acoustic Metamaterial Absorbers for Aircraft Noise Control

Your Task

Vibration and noise control are crucial in industries like aerospace, aviation, and automotive engineering, as mechanical vibrations and acoustic emissions can impact performance, safety, and structural integrity. Passive acoustic and vibroacoustic metamaterials offer a promising solution by using engineered structures with unique properties, such as negative effective density or stiffness, to reduce vibrations and noise without external power. By targeting specific frequency ranges, these materials provide robust, low-maintenance noise mitigation.

The aim of this Master's project is to design, numerically model, and experimentally validate three passive acoustic and vibroacoustic metamaterial absorbers optimized for distinct application scenarios, including helicopter cabins and aircraft engines. The study will focus on plate- and membrane-based but also further metamaterials designs, seeking to maximize sound and vibration absorption efficiency across relevant frequency ranges while ensuring structural feasibility. The resulting insights are expected to advance the understanding of passive metamaterials for practical noise and vibration control in demanding aerospace applications.



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Your Skills

- Good knowledge in engineering mechanics and mathematics
- Basic knowledge in Dynamics of Structures
- Basic knowledge in FEM/COMSOL simulations
- High interest in understanding of mathematical/theoretical equations

Contact

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