

Master nanosciences-nanotechnologies specialty ETECH

Internship 2022-2023

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Research group: EPHONI

Title: Acoustic metamaterial barrier for sound attenuation in low frequency range

Titre : Barrière acoustique pour l'atténuation du son à basses fréquences

Abstract:

Metamaterials are structured materials which present remarkable physical properties that are impossible to achieve with homogeneous current materials. Many developments are based on the interaction of waves of all types, electromagnetic, acoustic or mechanical vibrations with these new materials. It is shown that the metamaterial can be used to reach properties in the sub wavelength regime. Based on this property, it has been demonstrated that waves can be focused with high resolution, attenuated at low frequency, deflected with anomalous refraction and reflection, guided and controlled by judiciously designing devices.

The EPHONI team is involved in several of these research topics, and offers a project in the field of acoustics. The aim of the internship Master is to develop an optimized device to improve the acoustic attenuation of audible low frequency sounds. Knowing that these sounds are only attenuated significantly by thick and heavy walls, any progress towards relatively thin and light absorbing materials has an important potential of concrete applications.

The subject, supervised by members of the EPHONI team, is to realize a device for the attenuation of low frequency sounds. This subject requires a series of classical steps, from design (modeling and numerical optimization, COMSOL software), to realization (3D printing) to finish on experimental validations (acoustic measurements). These various stages will allow the candidate to use the skills acquired during his training and to acquire or improve in the fields of metamaterials, simulation and measurement.

Experimental technics :

3D printing, Finite element code COMSOL, measurement and processing of acoustic signals.

Laboratory/team :

IEMN, EPHONI