



PhD offer

Acoustic Absorbing Metasurfaces

Hosting University and Lab: **University of Lorraine – CNRS, Institut Jean Lamour – France**

Supervisor : Badreddine ASSOUAR (Badreddine.Assouar@univ-lorraine.fr)

Subject:

We are seeking for a brilliant PhD candidate to start a PhD project on Acoustic metamaterials/metasurfaces for low-frequency absorption to start on October 2021. Our group in the Institut Jean Lamour (IJL), Institution belonging to the University of Lorraine and CNRS, develops since many years different research topics related to acoustic/elastic metamaterials and metasurfaces, both on theoretical and experimental aspects. This has led to some majors achievements in the field of metamaterials [1-4]. The challenge of low-frequency acoustic absorption and elastic wave mitigation based on lightweight thin meta-structures has been one of the most exiting one we have faced, and with which we aim to cope in this proposed PhD project.

This PhD project is funded by Dassault Aviation in the context of the new common lab (LabCom Molière) regrouping, the IJL, IPCMS, CNRS and Dassault Aviation. This objective of this LabCom is to enhance and promote the collaboration between academic and industrial researches on materials science. More specifically, the proposed PhD project on acoustic metasurfaces for absorption will be one of the main foundations of this large LabCom Molière.

Regarding the PhD thesis project, we propose to theoretically develop and experimentally demonstrate the concept of omnidirectional broadband thin metamaterial/metasurface for low-frequency absorption [50-500 Hz]. We, indeed, would like to develop a transformative approach by which we can implement these multi-functionality feature into a thin metastructure having different geometrical forms. To achieve this goal, numerical and theoretical platforms will be established in the first part of the PhD project as a first foundation. This will include the development of inverse design strategies based on deep-learning and Neural Networks approaches.



The latter will then bring the project to the experimental track including the conception/design, fabrication and experimental analysis of the multifunctional metasurfaces.

To lead this project with its different aspects, we are seeking for a brilliant PhD candidate who has a strong background in at least two of the following fields: physical acoustics, wave physics, applied physics, materials physics, ... He/she should have very good English writing and communication skills. Some fundamentals in computing and experimental work will be a plus.

The hosting institution is the Institut Jean Lamour, one of the largest research institutions in France. The candidate will work in the “Metamaterials and Phononics group” led by B. Assouar. The group has advanced facilities and equipment, given a great opportunity and environment to students to interact, create, innovate and implement their researches and own ideas in a dynamic group.

References

1. M. B. Assouar, B. Liang, Y. Wu, Y. Li, J-C. Cheng & Y. Jing. Nature Reviews Materials 3, (2018) 460.
2. Y. Li & M. B. Assouar. Appl. Phys. Lett., 108 (2016) 063502.
3. Y. Zhu & M. B. Assouar. Phys. Rev. B, 99 (2019) 174109.
4. S. Qi, Y. Li & M. B. Assouar. Phys. Rev. Applied, 7 (2017) 054006.

Candidate profile

- Master degree in one of these specialties: acoustics, applied physics, material physics, wave physics, mechanical engineering ...
- For the Master students who are interested, please send your CV, a motivation letter, your marks for the Master and copy of your ID.
- This offer is only eligible for students having a citizenship from a European country.
- Benefit: 1400€ net/month (1770€/month: gross salary) + health insurance.
- **Deadline of application: April 30, 2021.** Thesis to start on October 2021.