



PhD studentship in Experimental fluid mechanics “Oscillating flows”

Acoustic energy losses in different oscillating flow regimes: Experimental investigations

Applicants are invited for a 3-year Ph.D. studentship in Pprime laboratory at the University of Poitiers. The successful candidate will have the opportunity to work within a research team of an ANR-funded project, named *ImClean*, willing to improve the performance of thermoacoustic refrigerators.

Thermoacoustic refrigerators offer a green alternative to conventional refrigeration systems as they use environmentally friendly gases. Besides their simple construction, they include less mechanical moving parts and hence require less maintenance. However, their performance is impacted by several non-linear phenomena such as streaming, natural convection, transition to turbulence, ..etc. Both understanding and quantifying the effects of these non-linear phenomena on performance are vital for designing more performant refrigerators.

This PhD Project focuses on quantifying the effects of both the transition to turbulence of oscillating flow and flow discontinuities on acoustic energy losses. An experimental setup will be developed to allow for generating oscillating flows at different frequencies and Reynolds numbers. This experimental setup will be equipped with different microphones for acoustic measurements. In addition, PIV measurements will be performed to understand the mechanism of acoustic energy losses in the different oscillating flow regimes. To quantify the effects of flow discontinuities (e.g. changing flow area or flow direction), the experimental setup will be modified to include such discontinuities. Both acoustic and fluid measurements will be performed for several discontinuities. The outcomes of the PhD project can be integrated with the available design tools for better designing thermoacoustic machines.

The post-holder will gain experience in:

- Measurement techniques related to both fluid mechanics and acoustics;
- Designing experimental setup;
- Physical data analysis in multidisciplinary topics;
- Working in a multi-disciplinary team on a large research project.

Requirements and skills of the candidate:

- Good knowledge of acoustic, and fluid mechanics;
- Passionate about performing experiments and physical data analysis;
- Good knowledge of programming, Matlab is preferred.

Supervisors:

- Islam Ramadan, Assistant professor, Institut Pprime, université de Poitiers.
- H el ene Bailliet, Associate professor, Institut Pprime, universit e de Poitiers.

Application:

Applicants are asked to provide the following documents:

- A detailed CV;
- A motivation letter.

These documents should be sent to Dr. Islam Ramadan (islam.ramadan@univ-poitiers.fr).

Application deadline: 30 March 2025

Start date: October 2025