Ph.D. Thesis Opening

Reactive control of turbulence and noise from wing profiles

Institut Pprime, through its *Aerodynamics, Acoustics & Turbulence* research group, seeks a highly motivated Ph.D. candidate. The research project is connected with other research activities currently being developed in a long-partnership with Airbus.

Project overview

Following the elaboration of a novel flow-control framework [1], the *Aerodynamics, Acoustics & Turbulence (2AT)* research group of Institut Pprime has pioneered the real-time control of turbulent flows. The group has successfully applied the control methods experimentally to different complex, high-Reynolds-number flows, on four academic demonstrators [2–5]. On that basis, *2AT* researchers aim to extend the flow-control activity to airfoils, more specifically, to reduce airfoil noise.

The Ph.D. candidate will explore different flow control designs, combining choice and location of flow sensors, actuators, and control objectives, to mitigate airfoil noise. The candidate will leverage flow-control algorithms, suitable for numerical and experimental application, used in three precursor studies [1, 4, 5]. Numerical simulations will be carried out using in-house high-fidelity CFD tools available at Institut Pprime, and experiments will be performed at anechoic wind tunnels, such as *Bruit & Vent* and *Beti*, the jet-noise facility of Institut Pprime.

Position details

- **Duration:** 36 months
- **Start date:** October 2026
- **Location:** Institut Pprime, Poitiers, France
- **Net salary (per month):** between 2.0 & 2.2 k€/month

Required qualifications

- Master's degree (or higher) in mechanical/aerospace engineering or related field
- Previous experience in numerical simulations and/or experimental work are desired, but not mandatory

Desired qualities

- Strong teamwork and communication skills
- A drive for applied research
- Ability to take initiative and work independently
- Interest in future projects on flow-control for aerospace applications

A unique opportunity

The position offers the chance to work on an applied, high-impact, industry-connected project at the frontier of aerodynamics, aeroacoustics and flow control, with real-world applications.

To apply

Send a CV and cover letter detailing your relevant experience and motivation to `eduardo.martini@ensma.fr` and `peter.jordan@univ-poitiers.fr`

References

[1] Martini, E., Jung, J., Cavalieri, A.V.G., Jordan, P., Towne, A. (2022) *Resolvent-based tools for optimal estimation and control via the Wiener-Hopf formalism.* Jnl. Fluid Mech. Vol. 937

[2] Maia, I.A., Jordan, P., Cavalieri, A.V.G., Martini, E., Sasaki, K., Silvestre, F., (2021) *Real-time reactive control of stochastic disturbances in forced turbulent jets* Physical Review Fluids 6, 123901

[3] Maia, I.A., Jordan, P., Cavalieri, A.V.G. (2022) *Wave cancellation in jets with laminar and turbulent boundary layers: The effect of nonlinearity* Physical Review Fluids 7, 033903

[4] Audiffred, D., Cavalieri, A.V.G., Maia, I.A., Martini, E., Jordan, P. (2024) *Reactive experimental control of turbulent jets* Jnl. Fluid Mech. Vol. 994

[5] Audiffred, D., Mancinelli, M., Cavalieri, A.V.G., Martini, E., Jordan, P. (2024) *Experimental Control of Jet Installation Noise* AIAA-CEAS Aeroacoustics conference, Rome AIAA-3314