

Image Reconstruction Based on CFD Data in Paraview M2 Internship (January - February 2025, 6 months)

In the context of the French ANR project *SimBI* ("Simulation-based Imaging for Two-Phase Flows"), an internship position is open for a Master 2 student starting from January or February 2025, for a duration of 6 months.

The goal of this internship is to adapt optical reconstruction techniques, based on ray tracing, already available in **Paraview** (a widely used software for CFD postprocessing) to simulate real optical diagnostics for flow measurement. Specifically, the internship will focus on shadowgraphy image reconstruction for simple interfacial flows, such as droplets and cylindrical liquid jets.

Although ray tracing and optical theory for image reconstruction are already developed at the CORIA lab using in-house code, the aim is to integrate this with **Paraview's** framework. The ultimate goal is to create a dedicated plugin capable of imaging liquid-gas flows with interfaces, mimicking a real experimental setup. The results will then be made widely available under an open-source license.

Optical reconstruction will be compared to real experimental data already available at the lab. The project's developments are based on open-source coding, facilitating broad dissemination and contributing to the improvement of comparisons between CFD simulations and experimental imagery.

Duration: 6 months, with the possibility of continuing into a PhD, depending on the success of the internship.

Host team: The thesis will be carried out at the **CORIA laboratory**, within the **TASC** and **DOL** departments. You will work with a team of around ten people specializing in numerical simulation and optics.

Experience acquired during the project:

- Coding (primarily Python)
- Optical reconstruction and optical diagnostics
- Numerical simulation of flows (CFD – Computational Fluid Dynamics)
- International work experience

Career opportunities after the internship:

- Possibility to apply for a PhD (funding already available) in the same project or in CFD or optics
- Opportunities in industry, particularly in engineering, research and development departments, or fields involving numerical flow simulations, such as aeronautics, automotive, energy, and more.

Salary: In France, Master 2 students typically receive a net stipend of around €600 per month during their internship.

Working language: English in the professional environment

Profile required:

- Master 2 student with programming skills, particularly in Python, and a strong interest in coding
- Knowledge of one or more of the following areas is a plus: optics, fluid mechanics, image processing

Contact by mail: Fx Demoulin - demoulin@coria.fr