

JOB OFFER – STAGE

High-fidelity simulation of the flow inside a gaz turbine diffuser

OFFER INFORMATION

Reference: AAM-2026-COL-01

Location: 42 Avenue Gaspard Coriolis – 31057 Toulouse

Team: AAM

Supervisors:

- Arthur Colombié, colombie@cerfacs.fr
- Guillaume Daviller, daviller@cerfacs.fr

Gratification: 800€ net per month - M2 level or last year at engineering school

Period: 6 months - from: 02/03/2026

Key words: CFD, Turbulence, LES, HPC

CERFACS

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HOSTING TEAM - AAM

The Advanced Aerodynamic & Multiphysics (AAM) team is dedicated to developing cutting-edge numerical methods, physical modeling, and High-Performance Computing (HPC) techniques for new Computational Fluid Dynamics (CFD) solvers. The work focuses on fluid dynamics simulations for aircraft, rockets, and turbomachinery, in close collaboration with Cerfacs partners.

CONTEXT

To comply with the European objectives of carbon neutrality in 2050, the civilian aircraft transportation requires advanced numerical tools to allow for fast and reliable analysis of new innovative aircraft systems. In this context, machine learning is becoming a fundamental technology for computational fluid dynamics. It has been widely used in several domains such as solver acceleration, accuracy increase of turbulence modeling (LES, RANS and hybrid framework) and the development of reduced models in place of current physical models. This intern position is aligned with the objectives of ROSAS European project which aims at the development of third generation CFD tools, pushing back the limits of design and filling the gap that remains between academic research and industrial applications. To ease the model developments, it is necessary to rely on a large, high-fidelity database that is representative of the complex phenomena encountered in aeronautics applications. The first part of the ROSAS project aims at expanding the literature, and the missions proposed for this study fall within this framework.

MISSION

This internship aims to study a modeled diffuser, representative of gas turbine engine. In this context, the candidate main task will be the meshing and simulation of the test case identified in the first stage of ROSAS project. The good prediction of the turbulence is a major challenge of the project; thus, the validation of the simulations will be an important part of the work. These simulations will be performed using CERFACS numerical resources (code, computation means). Another significant task will be the coding and validation of a boundary condition, dedicated to the configuration, inside a research computational software (written in FORTRAN 90). Depending on the progress of the work, an analysis of the flow dynamics might be considered, to improve the physical knowledge of turbulent wall-bounded flows and their modeling.

DESIRED PROFILE

- The candidate must have knowledge in fluid mechanics and turbulence (aeronautics/fluid mechanics, computational physics... courses)
- Experiences in CFD are mandatory. Some knowledge in LES/DNS is an advantage.
- Programming basis are also necessary. Especially, the candidate must be fluent with python language. The knowledge of FORTRAN 90 is appreciated.
- The candidate will be required to present his/her work in English, both orally and in writing, in line with the standards expected in an international research laboratory.

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HOW TO APPLY ?

To apply, please send your CV and covering letter to colombie@cerfacs.fr (cc à daviller@cerfacs.fr) , applications are open until 31/12/2025.

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