JOB OFFER – POST-DOCTORAL

High-fidelity flow simulations on complex geometries

OFFER INFORMATION

Reference: AAM-2025-DAV-03
Team: AAM

Lieu : 42 Avenue Gaspard Coriolis – 31057 Toulouse

Contact person:

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Period: 1 renewable year – from February 2025
Salary: 40 K€/year (gross)
Level of education required: PhD

Key words: CFD, compressible turbulence, HPC, LES

CERFACS

CERFACS is a private research, development, transfer and training center for modeling, simulation and high-performance computing. CERFACS designs, develops and proposes innovative software methods and solutions to meet the needs of its partners in the aeronautics, space, climate, environment and energy sectors. CERFACS trains students, researchers and engineers in simulation and high-performance computing.
CERFACS works closely with its seven partners: Airbus, Cnes, EDF, Météo France, Onera, Safran et TotalEnergies.

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 un 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 post-doctoral position takes part 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 post-doctoral study fall within this framework.

MISSION

This post-doctoral study primarily aims at the generation of high-fidelity data for development and validation of IA-based models. In this context, the candidate will play an active role in the discussions concerning the selection of reference test cases and needed data for model development.

His/her main task will be the generation of the expected data on the selected test cases, relying on the numerical resources provided by CERFACS (codes and calculations means). The simulations will have to be finely validated considering turbulence and the generated acoustics. This validation stage is a prerequisite for using the data for machine learning and it is essential to control the level of fidelity of the results obtained in the project.

Finally, the candidate must have the ambition to improve the physical knowledge of wall-bounded flow, by analyzing finely the physics encountered in the selected flow. Indeed, the presence of obstacles or diffusion phenomena greatly affect the boundary layer development, which is therefore subjected to adverse pressure gradient effects. The slowdown in the near wall region conducts to a modification of the turbulent structures, leading to boundary layer separation and/or appearance of complex flow characteristics, making it difficult to model properly. The understanding of the physical background at play in the development of separated and/or 3-dimensionnal flows represents an additional challenge considering the correct modeling of such configurations

DESIRED PROFILE

- PhD defended less than 3 years ago.
- The candidate must have knowledge in fluid mechanics, turbulence and numerical simulation.
- Knowledge in acoustics is an advantage
- the candidate will be required to present his/her work both orally and in writing in English, 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 cover letter to **daviller@cerfacs.fr** **(**copy to colombie@cerfacs.fr) , applications are open until **31/01/2025**.

See you soon at CERFACS!