

POST-DOC PROPOSAL - Fixed-term contract

AVBP High Order

Reference: CFD-2022-GICQ-01

Team: CFD

Research unit: **Energetics and propulsion**

Salary: 30 K€/year (gross)

Duration: 1 year - **Starting date:** October 2022

Location: 42 avenue Gaspard Coriolis – 31057 Toulouse

Contact person: **Laurent Gicquel**

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odier@cerfacs.fr

Level of education required: PhD

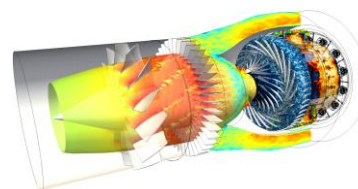
HOST LABORATORY

The Cerfacs is a fundamental and applied research center specializing in modelling and digital simulation. Through its resources and expertise in high-performance computing, it addresses major scientific and technical problems in public and industrial research. The Cerfacs teams develop innovative methods and software solutions to meet the needs of the aeronautics, space, climate, energy and environment sectors. Cerfacs works in close interaction with its seven associates: Airbus, Cnes, EDF, Météo France, Onera, Safran and TotalEnergies.



HOSTING TEAM

The CFD (Computational Fluid Dynamics) team is the largest team at CERFACS. It focuses on the simulation of flows by developing advanced numerical methods and applying them to aircraft, rockets, helicopters, car engines, turbines, etc. This team develops essential tools in many application fields with a well-known leitmotiv in industry today: let's calculate systems (aircraft, engines, etc.) before building them.



JOB DESCRIPTION

Topic(s): **Numerical Methods** **Applied Mathematics** **High Performance Computing**

Context: the AVBP solver, used by CERFACS' industrial partenaires, is recognized worldwide as efficiently taking advantage of worldwide super-computers while providing access to reference and robust models dedicated to Large Eddy Simulations either for turbulent, multi-phase, reacting (or non reacting) compressible flows. AVBP is indeed regularly awarded and the team is clearly an international reference in the field. Although qualified as a legacy code, AVBP routinely evolves algorithmically to adjust to the fields of computing science and HPC and has allowed it to remain at the forefront. It however remains of interest to have its numerics to evolve towards higher order schemes to benefit from the precision to cost ratio of such methods while improving the control of models, mesh quality impact for all available LES models.

Mission:

The mission will consist in deriving and analyzing the new type of Petrov-Galerkin schemes compatible with the existing framework of AVBP: i.e. cell-vertex. The objective will be to ensure that proposed new schemes have induced costs that are inline with existing schemes in the code either in 2D, 3D and for various cell types. To do so, one will make use of the work by Benjamin Martin and Mike Rudgyard, consultant at CERFACS and at the origine of AVBP. Likewise, the CFD & COOP teams from CERFACS will be strongly implicated. Knowledge in the fields of HPC, Fortran 90 and unstructured codes would be appreciated.

DESIRED PROFILE

Background required:

Large Eddy Simulation
Fortran, C, C++

Numerical methods (Finite Volume / Finite Elements)

GPU is appreciated

Languages: French and English

High-Performance Computing

Abilities:

Capacity for analysis and synthesis

Innovation capacity

Ability to work independently

Relational qualities

Rigorous

PLEASE SEND CV + COVER LETTER

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