

JOB OFFER – POST-DOCTORAL

Machine learned high-accuracy unstructured numerics with boundary conditions

OFFER INFORMATION

Reference: 2024-MPK-03

Team: ALGO

Location: 42 Avenue Gaspard Coriolis – 31057 Toulouse

Contact person: MOHANAMURALY Pavanakumar
DAVILLER Guillaume

Period: 1 year - from: 01/09/2024

Salary: 40 K€/year (gross)

Level of education required: PhD or equivalent

Key words: Machine Learning, Graph Neural Network, Residual Distribution Schemes, Unstructured mesh, CFD

CERFACS

Cerfacs is a private research, development, transfer and training center for modeling, simulation and high-performance computing. Cerfacs designs, develops and proposes innovation 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.

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HOSTING TEAM - ALGO

Within the Algo-COOP team, the Algo group conducts research in the fundamentals of high performance simulation. This includes a wide range of topics in applied mathematics, such as scalable algorithms in numerical linear algebra, iterative and direct algorithms for large linear systems, novel methods for solving partial differential equations, data assimilation, optimisation, uncertainty quantification and scientific machine learning.

CONTEXT

CERFACS aims to advance its competence at the intersection of data science and computational physics. Through our strategic focus on Data-Driven Modelling, we aim to revolutionize high-performance computational physics by seamlessly integrating data science tools, particularly neural networks, into existing computational fluid dynamics workflows to enhance and accelerate numerical simulations.

MISSION

The post-doctoral researcher in this position is expected to build upon recent advancements in machine-learned numerical schemes. The key focus is on extending graph neural networks to incorporate boundary conditions and efficiently couple with HPC solvers to achieve acceleration and enhancement of the numerical schemes, in our flagship unstructured solver AVBP. By leveraging cutting-edge technologies such as the Anamika visual ML DSL, we aim to develop automated code generation approaches for seamless integration with AVBP, enabling zero data exchange cost and extending applications to areas of combustion LES simulations and climate modelling.

DESIRED PROFILE

- You have defended your thesis less than 3 years from the date of this job offer.
- PhD in Computational Fluid Dynamics, Applied Mathematics, or related fields.
- Experience in designing and implementing numerical schemes for HPC CFD.
- Proficiency in building Machine Learning models (Training, Hyperparameter tuning, etc.).
- Proficiency in programming languages C++, Fortran, and Python.
- Knowledge of spectral stability analysis of numerical schemes is desirable.
- Familiarity with HPC environments and performance optimization.

WHAT WE OFFER AT CERFACS

- Broad access to technology, a rich interpersonal environment, in-house skills recognized nationally and internationally.
- An inclusive and equitable work environment.
- A structure accessible to people with disabilities.
- A complementary health insurance scheme offering excellent health care coverage in addition to social security, with the possibility of enrolling family members (spouse and children).
- 6 weeks' annual leave (with the possibility of 22 extra days' leave per year linked to your choice of a 39-hour rather than 35-hour working week).
- Flexible working arrangements, with the possibility of working from home up to two days a week.
- A sustainable mobility package enabling employers to pay up to a maximum of 500 euros a year to cover the home-to-work travel costs of staff who cycle to work.

HOW TO APPLY ?

To apply, please send your CV and covering letter to mpkumar@cerfacs.fr & daviller@cerfacs.fr , applications are open until 31/07/2024.

See you soon at CERFACS!