

Researcher on high-fidelity spray flame simulations - Propulsion Technologies Group (R2)

Job Reference

350_22_CASE_PTG_R2

Position

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Closing Date

Friday, 30 September, 2022

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About BSC

The Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS) is the leading supercomputing center in Spain. It houses MareNostrum, one of the most powerful supercomputers in Europe, and is a hosting member of the PRACE European distributed supercomputing infrastructure. The mission of BSC is to research, develop and manage information technologies in order to facilitate scientific progress. BSC combines HPC service provision and R&D into both computer and computational science (life, earth and engineering sciences) under one roof, and currently has over 770 staff from 55 countries.

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Context And Mission

Currently, most propulsion technologies employed within the transportation sector rely on liquid fuel combustion systems. Modelling these reacting two-phase flows remains a challenging task due to the tightly coupled interaction between spray (including atomization, secondary breakup and evaporation), turbulence, and combustion. Dual-fuel combustion concepts, under assessment as a possible solution for the development of next-generation low-to-zero CO₂ aero-engines, add an additional layer of complexity as state-of-the-art models

need to account for the characteristics of hydrogen and/or synthetic fuel combustion such as sustainable aviation fuel (SAF). The need for more fuel-efficient systems with lower greenhouse gas emissions keeps driving the development of models and high-performance computing (HPC) tools with better predicting capabilities for spray flames.

Within this context, the applicant will lead the development and implementation of models for high-fidelity spray flame simulations. Research activities will be carried out in the framework of the EU project CoEC <https://coec-project.eu> seeking to improve the fidelity of spray flame simulations with SAF. The applicant will join the Propulsion Technologies Group (PTG), a research group from the Computer Applications in Science and Engineering (CASE) Department at the Barcelona Supercomputing Center. As part of the PTG, the applicant will form part of a multidisciplinary team of researchers with a strong background on Computational Fluid Dynamics (CFD) applied to high-fidelity simulations for the development of clean propulsion and power generation systems. The PTG is actively involved in several European research-oriented and industrial projects for which results are disseminated in highly ranked scientific journals and conferences.

The applicant is expected to work on the optimization of an in-house developed Lagrangian solver and to extend the capability of the CFD solver with atomization, secondary breakup, and multi-component evaporation models to be coupled with finite rate and tabulated chemistry combustion models for spray flame simulations.

Key Duties

- Refactoring of an in-house developed Lagrangian solver to increase performance.
- Leading the development and implementation of atomization, secondary breakup, and multi-component evaporation models.
- Coupling multi-component evaporation models with finite rate and tabulated chemistry combustion models
- Interact with the different partners of the CoEC project to carry out our collaborative research.
- Contribute to scientific publications and report to different National and EU projects in which the researcher will be involved.

Requirements

- Education
 - › The candidate should hold a PhD Degree in Computer Science, Physics, Mechanical Engineering, or Aerospace. Background in combustion and thermal systems will be considered an asset.
- Essential Knowledge and Professional Experience
 - › Knowledge of fluid mechanics, multi-phase flows, and thermodynamics is expected. Advanced understanding of spray modelling is also expected.

- Additional Knowledge and Professional Experience
 - › General knowledge of computer science, HPC, and programming languages such as Fortran, Python, C, and C++ will be considered an asset.
 - › Fluency in English is essential, Spanish is welcome.
- Competences
 - › Strong analytical skills.
 - › Ability to work independently and make decisions.
 - › Good communication and teamwork skills to work in a multidisciplinary team.

Conditions

- The position will be located at BSC within the CASE Department
- We offer a full-time contract, a good working environment, a highly stimulating environment with state-of-the-art infrastructure, flexible working hours, extensive training plan, tickets restaurant, private health insurance, fully support to the relocation procedures
- Duration: Open-ended contract due to technical and scientific activities linked to the project and budget duration
- Salary: we offer a competitive salary commensurate with the qualifications and experience of the candidate and according to the cost of living in Barcelona
- Starting date: October

Applications procedure and process

All applications must be made through BSC website and contain:

- A full CV in English including contact details
- A Cover Letter with a statement of interest in English, including two contacts for further references - Applications without this document will not be considered

In accordance with the OTM-R principles, a gender-balanced recruitment panel is formed for every vacancy at the beginning of the process. After reviewing the content of the applications, the panel will start the interviews, with at least one technical and one administrative interview. A profile questionnaire as well as a technical exercise may be required during the process.

The panel will make a final decision and all candidates who had contacts with them will receive a feedback with details on the acceptance or rejection of their profile.

At BSC we are seeking continuous improvement in our recruitment processes, for any suggestions or feedback/complaints about our Recruitment Processes, please contact recruitment@bsc.es.

For more information follow [this link](#)

Deadline

The vacancy will remain open until suitable candidate has been hired. Applications will be regularly reviewed and potential candidates will be contacted.

OTM-R principles for selection processes

BSC-CNS is committed to the principles of the Code of Conduct for the Recruitment of Researchers of the European Commission and the Open, Transparent and Merit-based Recruitment principles (OTM-R). This is applied for any potential candidate in all our processes, for example by creating gender-balanced recruitment panels and recognizing career breaks etc.

BSC-CNS is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law.

For more information follow [this link](#)