610_23_CASE_PTG_R1

Job Reference

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Position

High-fidelity modelling of hydrogen-fired industrial combustors for steel manufacturing furnaces.

Data de tancament

Dimarts, 16 Gener, 2024
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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, was a founding and hosting member of the former European HPC infrastructure PRACE (Partnership for Advanced Computing in Europe), and is now hosting entity for EuroHPC JU, the Joint Undertaking that leads large-scale investments and HPC provision in Europe. 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 900 staff from 55 countries.

Look at the BSC experience:
BSC-CNS YouTube Channel
Let's stay connected with BSC Folks!

We are particularly interested for this role in the strengths and lived experiences of women and underrepresented groups to help us avoid perpetuating biases and oversights in science and IT research.

Context And Mission

The stringent emission regulations and the EU commitment to achieve net-zero greenhouse gas (GHG) emissions by 2050 (EU Commission, COM (2018) 773) is driving the power generation industry to prioritize the development of low-carbon technologies. To meet the European decarbonization objectives, the energy-intensive industrial sectors must be transformed in terms of low-carbon technology deployment. The metallurgical sector, with a high dependency on fossil fuels, could strongly benefit from clean combustion technologies and the use of cleaner and more sustainable fuels. Hydrogen and hydrogen-enriched fuels have
significant potential to enable the transition to a clean, low-carbon energy system. Nonetheless, reducing the emissions to the levels of the EU targets brings new challenges to the industrial sector and to the metallurgical sector, which is responsible for a large portion of the pollutant emissions produced in the industrial sector and has a high dependency on fossil fuel supply. Today, the industrial sector requires more efficient burners, which implies not only a reduction in fuel consumption, but also in carbon emissions, CO2, and pollutant emissions, particularly NOx. While the first goal can be achieved by the use of hydrogen as a fuel, for the second one there exist a variety of approaches, being one of them oxy-fuel combustion. Despite its advantages, oxy-fuel combustion poses a series of challenges that require a systematic analysis. Indeed, the greater temperatures reached reinforce the importance of thermal radiation on these flames and, therefore, its modelling is addressed in this context as a major goal.

Within this context, the candidate will develop a research activity which will comprise the development of a High-Performance Computing (HPC) platform to conduct high-fidelity Computational Fluid Dynamics (CFD) simulations of the furnace. The numerical simulations will be conducted with the multiphysics code Alya from BSC with the aim of obtaining further understanding on the combustion performance and dynamics after hydrogen is blended with natural gas and generate datasets for data analysis. These activities are conducted in the context of an EU project from Horizon Europe and the National Government from Spain in collaboration with a metallurgical company.

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), combustion and multiphase flows. 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 execution of these simulations and development of reduced-order models based on data-analytics and machine learning using Computational Fluid Dynamics with High-Performance Computing (HPC) techniques.

**Key Duties**

- Conducting high-fidelity combustion simulations of hydrogen flames using LES with tabulated chemistry.
- Characterization of oxy-fuel combustion
- Interact with the different partners of the projects to carry out our collaborative research.
- Contribute to scientific publications and reporting to different National and EU projects the researcher will be involved in.

**Requirements**

- **Education**
  - The candidate should hold a Master Degree in Chemistry, Physics, Mechanical Engineering, or Aerospace with background in fluid mechanics and thermal systems. Basic knowledge of HPC will be appreciated.

- **Essential Knowledge and Professional Experience**
  - Knowledge of fluid mechanics and thermodynamics are expected.
• Additional Knowledge and Professional Experience
  ○ General knowledge on computer science and programming languages such as Fortran, Python, C, and C++ will be considered an asset.

• Competences
  ○ Strong analytical skills.
  ○ Ability to work independently and within a team.
  ○ Good communication and team-work skills to work in a multidisciplinary team.
  ○ Fluency in English is essential, Spanish is welcome.

Conditions

• The position will be located at BSC within the CASE Department
• We offer a full-time contract (37.5h/week), a good working environment, a highly stimulating environment with state-of-the-art infrastructure, flexible working hours, extensive training plan, restaurant tickets, private health insurance, support to the relocation procedures
• Duration: Open-ended contract due to technical and scientific activities linked to the project and budget duration
• Holidays: 23 paid vacation days plus 24th and 31st of December per our collective agreement
• 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: 01/02/2024

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 [at] bsc [dot] es.

For more information follow this link

Deadline

The vacancy will remain open until a 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](https://www.bsc.es/ca/join-us/fellowships/61023caseptgr1)

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