

Project title / job position title

Postdoctoral Position, Large-eddy simulations of dual-fuel flames in gas turbines

Context and Mission

The design of modern combustion systems needs to address challenges in aspects related to global efficiency, reduction of pollutant emissions, major flexibility of operation and reduction of thermo-acoustic instabilities. A strategy to reduce CO₂ emissions and NO_x is to operate lean, but problems of blow-off and instabilities might arise and mitigation strategies need to be developed. The use of lean premixed combustion technologies shifts the core strategy to reduce NO_x, while keeping the flame stable at lean conditions. The design of the chamber comes with multiple requirements, more specifically concerning ignition, stability (including pressure oscillations), efficiency, and pollutant emissions, which makes its development a challenging task. Blending hydrogen with hydrocarbon-based fuels has been investigated as a potential strategy for reducing both GHG (CO₂), due to lower fuel carbon content, and nitric oxides (NO_x) emissions. These conditions will be investigated from the perspective of numerical simulations based on large-eddy simulation (LES) technique. This project is a nationally-funded project from the Spanish Minister in collaboration with CMT Motores Térmicos from Universitat Politècnica de València (UPV) and the Instituto de Investigación Aplicada a la Industria Aeronáutica (INAIA) from Universidad de Castilla La Mancha (UCLM).

The research team that the applicant will be involved is the Propulsion Technologies Group at CASE Department of BSC. The team is a multidisciplinary group with researchers from all disciplines and with strong background in Computational Fluid Dynamics (CFD). The team is involved in several EU and industrial projects related to this topic, where the successful activities and the publications on highly ranked scientific journals give the proved expertise.

Key duties

The main duties include the development of physical models for dual-fuel combustion and the study of dual-fuel flames with hydrogen using LES.

Requirements***Education***

The candidate should hold a PhD Degree in Aerospace, Aeronautics or Mechanical Engineering with background in turbulence and combustion.

Essential knowledge

General knowledge on fluid mechanics, LES, numerical methods, combustion chemistry are expected.

Additional knowledge

Computational skills and parallel programming for HPC are not necessary, but will be considered an asset.

Competences

- Ability to work independently and make decisions
- Fluency in English is essential, Spanish is welcome.

Application

The application should include:

- CV English, motivation letter and 2 support letters
- Starting date: 01/09/2021 - 30/09/2021
- Deadline: 15/08/2021
- <https://www.bsc.es/join-us/job-opportunities/27321caseptr2>

Contact

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