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1-year Postdoctoral position: Simulations of ignition in annular combustors

Desciption of the TIMBER project https://anrtimber.wordpress.com
During the design of cleaner and more efficient aerojet engines, reliability of re-ignition in high altitude must be demonstrated. The TIMBER project involves three laboratories (CERFACS-CORIA-EM2C) and the SAFRAN Group to study and accurately simulate the ignition process in annular multi-burner combustors similar to the ones found in aeronautical gas turbines. On the one hand, the large-scale simulations considered in this investigation require the use of the latest massively parallel clusters which make such supercomputing efforts affordable. On the other hand, complex multi-physics simulations are necessary to account for the wide range of

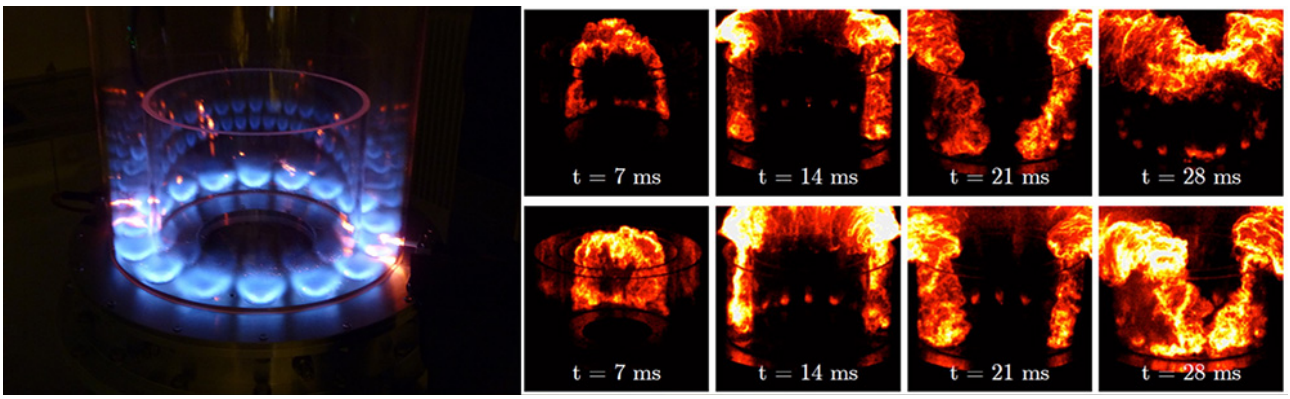

Figure 1: MICCA laboratory scale annular combustor (CNRS/EM2C) [1-2]

phenomena that are involved (two-phase flows, turbulence, combustion, conjugate heat transfer, radiation). Several experimental studies in unique multi-burner combustors have provided data to validate the different steps of the project.

Description of postdoctoral position
The EM2C CNRS Laboratory is seeking a highly qualified candidate for a postdoctoral fellowship in the area of **numerical simulatons, modelling and analysis of reactive and two-phase flows**. The successful candidate will join the EM2C research team led by Pr. Sébastien Candel and Dr. Ronan Vicquelin to study combustion dynamics in annular combustors.

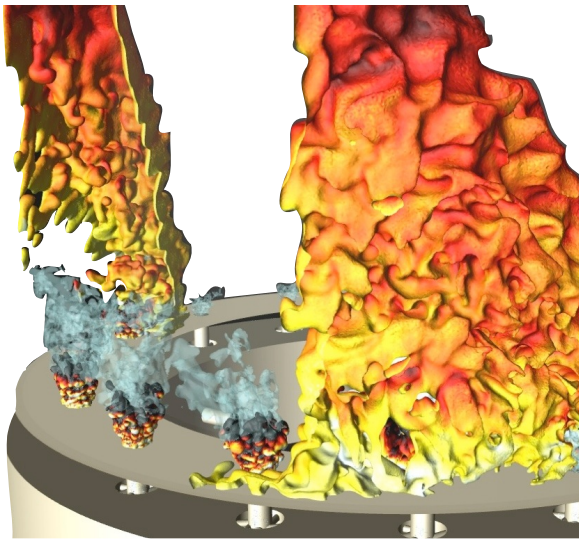

Figure 1: Large-Eddy simulation (LES) of ignition in the MICCA annular combustor [3-5]

The successful candidate will carry out **light-round simulations of a laboratory scale annular combustor** equipped with multiple injectors that can operate with liquid fuel injection. The impact of heat transfer which has been observed experimentally to significantly modify the flame propagation will be investigated. He/she will work in collaboration with colleagues at CERFACS.

The computational resources for such large simulations are available in an on-going PRACE project granted to EM2C and CERFACS.

The starting date of the position can be adjusted up to early 2018.

Qualifications:

- PhD in a relevant field
- Knowldge of turbulence, flow physics, two-phase flows and combustion
- Experience with compuational fluid dynamics, ideally with DNS or LES

How to apply:

Send the following documents to Dr. Ronan Vicquelin at ronan.vicquelin@centralesupelec.fr
Review of applications will begin immediately and continue until the position is filled.

- Copy of passport
- Cover letter
- CV with a list of publications and conferences
- Summary of recent work and interests
- Names and contact details of at least two referees
- Reference letters sent separately by the referees

[1] J.-F. Bourgouin, D. Durox, T. Schuller, J. Beaunier, and S. Candel. Ignition dynamics of an annular combustor equipped with multiple swirling injectors. Combustion and Flame, 160(8):1398 – 1413, 2013

[2] K. Prieur, D. Durox, J. Beaunier, T. Schuller, and S. Candel. Ignition dynamics in an annular combustor for liquid spray and premixed gaseous injection. Proceedings of the Combustion Institute, 36(3):3717– 3724, 2017.

[3] M. Philip, M. Boileau, R. Vicquelin, T. Schmitt, D. Durox, J.-F. Bourgouin, and S. Candel. Simulation of the ignition process in an annular multiple-injector combustor and comparison with experiments. Journal of Engineering for Gas Turbines and Power, 137(3):031501–031501, 09 2014.

[4] M. Philip, M. Boileau, R. Vicquelin, E. Riber, T. Schmitt, B. Cuenot, D. Durox, and S. Candel. Large eddy simulations of the ignition sequence of an annular multiple-injector combustor. Proceedings of the Combustion Institute, 35(3):3159–3166, 2015

[5] T. Lancien, K. Prieur, D. Durox, S. Candel, and R. Vicquelin. Large-eddy simulation of light-round in an annular combustor with liquid spray injection and comparison with experiments. Accepted in Journal of Engineering for Gas Turbines and Power, 2017