 



**Call for Postdoc**

**Title: Advanced Lattice Boltzmann modelling for reactive flows**

**Domain: turbulent combustion, LBM**

**Project: Advanced Lattice-Boltzmann Modelling of Combustion**

**Méthodes Avancées Lattice-Boltzmann En Combustion (MALBEC)
funded by the French National Research Agency (ANR)**

**Description**

Lattice Boltzmann (LB) solvers are becoming an ever more attractive alternative to traditional Navier-Stokes solvers. Reactive flow modeling in the LB framework, however, remain relatively marginal within the scientific community: most Lattice-Boltzmann schemes are limited to athermal flows.

Based our recent findings [1-8], Lattice-Boltzmann is an efficient [6] method for reactive flow simulations, including low Mach applications (plumes/fires) [3], thermo-diffusive instabilities [5], thermos-acoustic instabilities [2]. More recently, we have presented successful applications to detonations & thermos-acoustic instabilities on full-size burners [under review].

The team, now consisting of ~10 doctoral candidates and post-doctoral fellows is seeking a post-doctoral fellow, with experience in either:

* Turbulent combustion. The pdf structure of the LBM method allows for the development of new turbulent combustion models.
* Detonation or deflagration to detonation transition, for safety applications.

The objective is to investigate these processes, taking advantage of the low dissipative character of both pressure and vortical modes of the NS system, when modelled via LBM.

Note that the candidate is free to suggest alternative topics, matching his scientific interests.

**Expected profile of the candidate**

The candidate will have a PhD in computational fluid dynamics, with experience in the field of turbulent combustion (an experience with LBM is a plus). The numerical developments required will involve team-working skills to interact frequently with other postdocs/PhD students working on the same code, software engineers, associated industrials and supervisors.

**How to apply**

Send an application to: Pierre.Boivin@m2p2.fr including:

- A detailed CV

- A cover letter

**Starting date: as soon as possible.**

**Contract duration: one year, renewable every year.**

**Deadline to apply: 31/12/2022**

**References**

[1] S. Taileb, A. Millan-Merino, S. Zhao, and P. Boivin, “Lattice-boltzmann modeling of lifted hydrogen jet flames: a new model for hazardous ignition prediction,” Combustion and Flame, vol. 245, p. 112317, 2022.

[2] K. Bhairapurada, B. Denet, and P. Boivin, “A lattice-boltzmann study of premixed flames thermo- acoustic instabilities,” Combustion and Flame, vol. 240, p. 112049, 2022.

[3] M. Taha, S. Zhao, A. Lamorlette, J.-L. Consalvi, and P. Boivin, “Lattice-boltzmann modeling of buoyancy-driven turbulent flows,” Physics of Fluids, vol. 34, no. 5, p. 055131, 2022.

[4] M. Tayyab, S. Zhao, and P. Boivin, “Lattice-boltzmann modelling of a turbulent bluff-body stabilized flame,” Physics of Fluids, vol. 33, no. 3, p. 031701, 2021.

[5] M. Tayyab, B. Radisson, C. Almarcha, B. Denet, and P. Boivin, “Experimental and numerical lattice- boltzmann investigation of the darrieus-landau instability,” Combustion and Flame, vol. 221, pp. 103–109, 2020.

[6] P. Boivin, M. Tayyab, and S. Zhao, “Benchmarking a lattice-boltzmann solver for reactive flows: Is the method worth the effort for combustion?,” Physics of Fluids, vol. 33, p. 017703, 2021.

[7] M. Tayyab, S. Zhao, Y. Feng, and P. Boivin, “Hybrid regularized lattice-boltzmann modelling of premixed and non-premixed combustion processes,” Combustion and Flame, vol. 211, pp. 173–184, 2020.

[8] Y. Feng, M. Tayyab, and P. Boivin, “A lattice-boltzmann model for low-mach reactive flows,” Combustion and Flame, vol. 196, pp. 249 – 254, 2018.