Call for PhD (CIFRE)

Title: Advanced Lattice Boltzmann modelling for reactive flows

Domain: turbulent combustion, LBM

Project: Advanced Lattice-Boltzmann Modelling of Combustion
CIFRE grant, 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 on recent developments at M2P2, simulating reacting flows now seem within our grasp. A significant research effort is however required to achieve this target on realistic flows, e.g. including multi-level grid capabilities, the derivation of novel boundary conditions, turbulence models. In particular, applying and adapting the method to simulate the industrial partner's combustion chambers will be the central topic of the PhD topic.

The work will be carried out part time at M2P2 and within the research department of the industrial partner and will involve participating in an experimental campaign to validate the developments.

Expected profile of the candidate

The candidate will have a MSc or Engineering degree in computational fluid dynamics. 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: when available, from Jan. 2021 to Mar. 2021.

Contract duration: three years.

Deadline to apply: 20/12/2020

References

[1] 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.
[2] Y. Feng, P. Boivin, J. Jacob, and P. Sagaut, "Hybrid recursive regularized thermal lattice boltzmann model for high subsonic compressible flows," Journal of Computational Physics, vol. 394, pp. 82 – 99, 2019.
[3] G. Farag, S. Zhao, T. Coratger, P. Boivin, G. Chiavassa, and P. Sagaut, "A pressure-based regularized lattice-boltzmann method for the simulation of compressible flows," Physics of Fluids, vol. 32, no. 6, p. 066106, 2020.
[4] 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.
[5] 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.