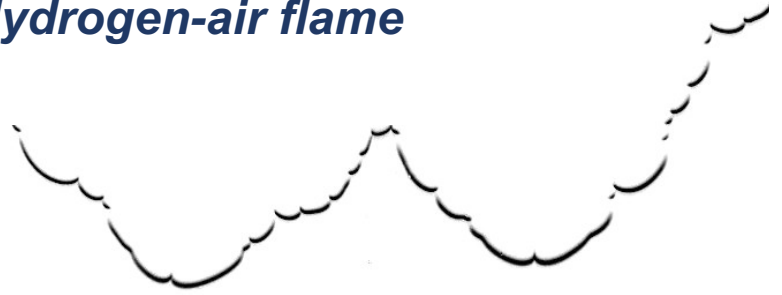


Vibro-acoustic instabilities of premixed Hydrogen-air flame

Available at [IRPHE](#)
in [Marseille](#), France

Starting date: as soon as possible



Context

In the context of greenhouse gases reduction, intense research is focused on hydrogen, but it rises questions in terms of safety and control. Its wide range of flammability limit and its small quenching distance increase the potential risk of hydrogen leaks. The precise description of the flame propagation is of prime importance, especially in confined environment. In such configurations, the burner walls can have a damping effect, by absorbing the thermal energy of the flame, but they can also trigger hydrodynamic instabilities by a vibro-acoustic coupling ^[1,2]. These instabilities have been recently discovered in slender geometries for propane-air premixed flames. The potential development of these instabilities for hydrogen-air premixture remains to be determined

Postdoc description

The Postdoc will consist in developing experimental apparatus for the analysis of hydrogen-air flame propagation in slender geometries. The emergence of pressure variations will be investigated for diverse hydrogen-air equivalence ratios and burner geometries. A theoretical model will be used to draw the limits the instabilities domains. Pressure and acceleration sensors will provide a physical and mechanical description, coupled to image analysis of the flame propagation images taken with high-speed cameras. In addition, the sensitivity of the instabilities to incoming flow variations and acoustic wave oscillations will be investigated. These descriptions will be facilitated by comparisons with existing numerical simulations made at M2P2.

Conditions

Applicants should hold a PhD in experimental combustion with visualization technique skills, curiosity and motivation to make progress in scientific knowledge. Coding and software development interest are also encouraged.

Duration: 12 to 24 month
Funding: ANR Agence Nationale pour la Recherche
Employer: CNRS
Net salary: more than 2k€ per month.

Email to christophe.almarcha@univ-amu.fr, with CV, cover letter, and references for informations and application.

[1] <https://doi.org/10.1103/PhysRevFluids.4.121201>

[2] <https://doi.org/10.1016/j.proci.2022.07.165>

