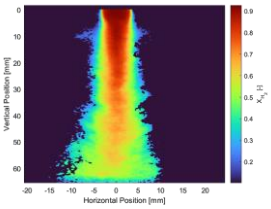

PhD position at IFP Energies nouvelles (IFPEN)

in *Mechanical engineering (Fluid mechanics and Energetics)*

Influence of Coupled Phenomena on Wall Heat Flux in an H2/Air Mixture for Decarbonized Mobility

As part of research into low-carbon transportation, particularly for heavy-duty vehicles, several technical solutions are currently under consideration, with a focus on hydrogen combustion. However, hydrogen differs from traditional hydrocarbons in terms of energy density and combustion behavior. It is crucial to investigate the heat fluxes generated by hydrogen combustion within a closed chamber. These issues are currently addressed using numerical models and simulations, akin to heat exchange mechanisms with hydrocarbons. However, these simulations lack experimental validation.

Indeed, validating these numerical models through experiments poses numerous challenges, primarily due to the characteristics of hydrogen combustion, such as its higher flame speed and interactions with chamber walls. The main objective of this thesis is to study the intrinsic mechanisms of wall heat transfer and isolate the various parameters involved in these phenomena, utilizing a canonical experimental setup with sophisticated laser diagnostics. The initial phase will focus on analyzing the hydrogen mixture in the chamber after injection using an inverse LIF system. A database will be created to explore different combustion modes (perfectly premixed flames, heterogeneous combustion, turbulent, and laminar combustion). Subsequently, combustion and wall heat flux will be examined for various thermodynamic conditions, approximating those encountered in real engine operations.

Collaboration with the PPRIME institute will bring expertise in heat flux measurement and combustion. Travel to the PPRIME institute is expected for exchanges with the thesis director and to conduct additional experiments.

Keywords: Hydrogen; Green combustion; Advanced Optical Diagnostics; Wall heat flux; Combustion mode

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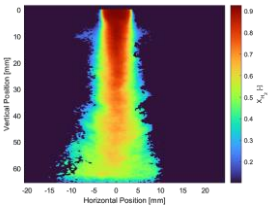
PhD location	IFP Energies nouvelles, Rueil-Malmaison, France
Duration and start date	3 years, starting in fourth quarter 2024
Employer	IFPEN
Academic requirements	University Master degree (or equivalent) involving Energetic, physics, thermal science and/or fluid mechanic
Language requirements	Fluency in French or English, willingness to learn French
Other skills appreciated	Programming skills for post processing data (Python, Matlab), knowledge in measurement techniques or optical diagnostics, willing to perform experiments

To apply, please send your cover letter and CV to the IFPEN supervisors indicated here above.

About IFP Energies nouvelles



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IFPEN offers a stimulating research environment, with access to first in class laboratory infrastructures and computing facilities. IFPEN offers competitive salary and benefits packages. All PhD students have access to dedicated seminars and training sessions. For more information, please see our dedicated WEB pages.