The French section of the combustion institute (GFC)

Invites you to a thematic workshop on

COMBUSTION AND MACHINE LEARNING

Wednesday 27th March at IFP Energies Nouvelles, Rueil-Malmaison

and broadcast online

In recent years, Machine Learning (ML) has revolutionized a multitude of technology sectors. Its innovative approaches provide fresh perspectives for addressing unresolved challenges. The field of combustion is no exception, as evidenced by the growing body of research integrating ML and combustion science.

A popular use of ML in combustion lies in refining simulation methodologies to enhance both precision and computational speed. For instance, ML can be utilized to augment subgrid-scale models in LES and RANS frameworks. Neural networks and other ML algorithms are particularly adept at expediting time-intensive tasks like chemistry integration. Beyond simulation improvements, ML's capability to process vast datasets and uncover intricate correlations among variables presents novel avenues for analyzing experimental data. Consequently, all sub-disciplines of combustion science, including experimental methodologies, stand to gain from the adoption of ML-driven techniques.

This one-day workshop offers the possibility for participants to present their work at the intersection of machine learning and combustion. We are happy to announce that two keynote lectures by respected actors in the field will be featured:

- Alessandro PARENTE (Université Libre de Bruxelles): "*An overview of data-driven methods to accelerate, improve and encode the simulations of turbulent reacting flows*"

Alessandro Parente got his PhD at the University of Pisa in collaboration with the University of Utah, where he served as a Research Associate from November 2007 to December 2009. In April 2009, Dr. Parente started working at the von Karman Institute of Fluid Dynamics. In October 2010, he was appointed Assistant Professor at the Aero-Thermo-Mechanical Department of Université Libre de Bruxelles. Since 2019, he has been a Professor at the same Institution. He currently leads the Brussels Institute for Thermal Fluid Systems and Clean Energy (BRITE).

- Elie HACHEM (CEMEF, Mines Paris PSL): "*Coupling Computational Fluid Dynamics and Machine Learning for Optimization and Design*"

Elie Hachem is Deputy Director of the CNRS CEMEF research center at Mines Paris PSL, head of the CFL Computational Fluid Dynamics research group, and Professor in Computational Mechanics at Mines Paris. His research focuses on the development of advanced numerical methods for fluid mechanics coupled with machine learning. He has received numerous professional and academic awards, including the IBM Faculty Award (2015), the Atos Joseph-Fourier Award (2019) for the best team in high-performance computing, and the IACM Fellow Award (2020) in computational mechanics. He currently holds an ERC Consolidator grant on fluid-structure interaction and machine learning for the control of unruptured intracranial aneurysms.

A welcome speech will be given by Pr Luc Vervisch, University Professor at the Institute of Applied Sciences in Rouen (CORIA laboratory), and currently president of IFPEN's scientific board.

Organizing committee: Cédric MEHL (IFPEN), Roda BOUNACEUR (LRGP) and Corentin LAPEYRE (CERFACS)
Registration (deadline: 1st March 2024): https://www.helloasso.com/associations/groupement-fran-cais-de-combustion-sfci/evenements/journee-thematique-ia-gfc