

PhD position at IFP Energies nouvelles (IFPEN) Mathematics – Data Science

Kinetic modeling transfer from fossil to NET-type feedstocks using transfer learning

IFPEN aims to become a key player in the triple energy, ecological and digital transition by offering differentiating technological solutions in response to the societal and industrial challenges of energy and climate. Some of the targeted technologies are industrial processes to produce biofuels, bioproducts and the recycling of plastics. Research and development efforts must be intensified for these applications. This intensification involves, among other things, the implementation of new methodological approaches combining data science and experimentation to achieve faster results and reduce R&I costs.

New environmental technologies (NET) domains, such as biofuels, plastic and tires recycling, are still young and the amount of accessible data is low, which explains the need to transfer knowledge from mature fields to this new field. One of IFPEN's areas of research is the design of catalysts to produce renewable, clean fuels and petrochemical bases. When a new catalyst is placed on the market, a model is needed to predict its performance and convince to customers. The model is trained on experimental points acquired under laboratory conditions, in small numbers (< 100 points). Later, industrial performances (>10,000 points) can be used to improve the initial model.

The objective of the thesis is to propose a methodology for the development of hydroprocessing models on NET-type feedstocks. The methodology will be based on a Data Science type approach: Transfer Learning. The goal is to develop models on these new feedstocks with a minimum number of points thanks to the use of data and models developed on fossil feedstocks via a transfer of information (model/domain adaptation). The methodology can be adapted to all types of liquid feedstocks relatively close to fossil feedstocks.

Keywords: data science, transfer learning, domain adaptation

Academic supervisor	Professor, JACQUES Julien, Laboratoire ERIC (Entrepôts, Représentation et Ingénierie des Connaissances) - Universités Lyon 2 et Lyon 1
Doctoral School	Ecole Doctorale en Informatique et Mathématiques de Lyon, http://edinfomaths.universite-lyon.fr/
IFPEN supervisor	Doctor, COSTA Victor, Département Intensification de l'expérimentation (R151), victor.costa@ifpen.fr
PhD location	IFP Energies nouvelles, Lyon, France
Duration and start date	3 years, starting in fourth quarter 2023
Employer	IFP Energies nouvelles, Lyon, France
Academic requirements	University master's degree in applied mathematics or in data science
Language requirements	Fluency in French or English, willingness to learn French
Other requirements	Advanced programming skills in python or R

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

About IFP Energies nouvelles

IFP Energies nouvelles is a French public-sector research, innovation and training center. Its mission is to develop efficient, economical, clean and sustainable technologies in the fields of energy, transport and the environment. For more information, see [our WEB site](#).

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](#).