Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : SAFDARI-SHADLOO Given names : Mostafa

Status (prof., assistant prof., ...) : Associate Professor

Laboratory : UMR CORIA 6014 Website address : https://www.coria.fr

Institution : INSA ROUEN NORMANDIE Website address : http://insa-rouen.fr/

Scientific competence of the supervisor:

Our research group is dedicated to the development of theoretical and computational modeling and control strategies for complex fluid flows, encompassing laminar, turbulent, and transitional regimes. Our primary focus lies in the developement of computer modeling, simulations, and algorithms, specifically applied to investigating the topology of flow structures in complex media. This includes single and multi-phase flows, with or without heat transfer, as well as energetic systems.

Two major publications in the field proposed for the PhD :

1. M. Mesgarpour, R Habib, M. S. Shadloo, N. Karimi, A combination of large eddy simulation and physics-informed machine learning to predict pore-scale flow behaviours in fibrous porous media: A case study of transient flow
2. M. Mesgarpour, O. Mahian, P. Zhang, S. Wongwises, L-P. Wang, G. Ahmadi, S. Nižetić, M. Sheremet, M. S. Shadloo. A hybrid deep learning - CFD approach for modeling nanoparticles' sedimentation processes for

Website address of the personal page :

Supervisor's email : mostafa-safdari-shadloo@insa-rouen.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** II-13

Title : Simulation of Particle Suspension in Air for Pollution Studies

Subject :

Suspended fine particles play a crucial role in air pollution, affecting both outdoor and indoor air quality with significant implications for public health. Understanding their transport and deposition mechanisms is essential, particularly for pollutants such as PM10, PM2.5, and PM1. Numerical simulations provide a powerful tool to study these complex phenomena, complementing experimental measurements and improving predictive models.

This PhD project focuses on the simulation of particle-laden flows in air using the open-source code such as "OpenFOAM", with an emphasis on understanding the dispersion, transport, and deposition of airborne pollutants. The research will involve Computational Fluid Dynamics (CFD) coupled with Discrete Element Method (DEM) approaches to track particle motion in turbulent flows. Lagrangian particle tracking techniques will be employed to study interactions between suspended particles and flow structures, optimizing models for real-world applications.

The candidate will develop and validate numerical models to simulate realistic urban and indoor environments, investigating key factors such as environmental effects, wall interactions, and particle aggregation. The outcomes of this

Keywords :

Fluid Mechanics, Theoretical modeling; Numerical Simulation; multiphase flows ; pollution and environement impact

Expected collaborations :

Background required from the applicant :

A Master degree in Fluid Mechanics and Heat Transfer, good knowledge of Applied Mathematics and Fluid Theories

Existence of a PDF file detailing the proposal ("yes" or "no") : YES