INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES ROUEN NORMANDIE

Ph.D. Thesis Offer

Title: Simulation of Particle Suspension in Air for Pollution Studies

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

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 research will contribute to improving air quality predictions and supporting the design of more effective pollution control strategies.

This position offers an exciting opportunity to work at the intersection of environmental science and computational modeling, utilizing open source codes to advance the study of airborne particulate pollution.

Requirement for the position: Master degree in fluid mechanics, numercial simulations

Laboratory: INSA Rouen, UMR 6614, CORIA

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