Introduction to transport phenomena:
Learning by numerical modelling with the use of the OpenFOAM library

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Outline :

We will learn about the importance of mass and energy transport in physical and chemical systems by constructing and running numerical models in an open-source library, OpenFOAM, for solving Partial Differential Equations with the Finite Volume Method.

We will learn how to set up a numerical simulation, run it on a single CPU and multiple CPUs, visualize the results and generate data plots.

We will study the diffusion of heat and matter in a quiescent medium (hot rod, Brownian motion), under the influence of an external field (capacitor, buoyancy), and under the influence of the macroscopic motion of the medium (mixing in the microfluidic channel).

Crediting:

To obtain a positive grade, each student must prepare a working numerical model of a transport problem of their choice. This is an opportunity to apply numerical modelling in their specific field of research.

First lecture:

within the period of March 3-7, 2025

Registration deadline:

February 24, 2025 - send an e-mail to pzuk@ichf.edu.pl

(The availability of this lecture course depends on whether at least three Warsaw4PhD students are registered.)