PhD position in Environmental Fluid Mechanics

We are seeking a full-time PhD student to join the Environmental Fluid Mechanics laboratory, led by Professor Pietro de Anna, at the Institute of Earth Science (University of Lausanne, Switzerland). This post is fully founded (gross salary of about 50,000 CHF per year) by the Swiss National Science foundation.

Desired profile

Master degree (or be near completion) in Physics or Mechanical Engineering or Civil & Environmental Engineering or related discipline with a good understanding of at least one of the following topics: i) laminar fluid flow, ii) colloidal suspension dynamics and iii) transport phenomena (dispersion, mixing and reactive transport). Some experience with applied mathematics (e.g. statistics, differential equations) is required. Knowledge of optical microscopy, image processing and microfluidics (use and fabrication) is desired but not necessary (advanced training will be provided). Written and spoken English are required, but working knowledge of French (the local language in Lausanne) is not necessary. Interest in developing microfluidics based experiments and optical techniques to investigate flow and transport driven filtration and microbial aggregation in confined media. Commitment to research based on experimental, numerical and modeling approaches.

Description of responsibilities

The successful candidate will work on a PhD thesis on colloidal/bacterial filtration by confined and heterogeneous media. This will be achieved by developing novel porous microfluidics devices (also fabricated with different materials) to understand i) how a porous medium microscopic structure determine the filtration of a flowing colloidal/bacterial suspension filtration and ii) how filtration dynamics affects (via clogging) the flow through such porous micro-structure. The physical, biological and chemical properties will be tuned independently. Using pumps, pressure controllers and time-lapse video-microscopy, flow experiments through these heterogeneous structures will be performed to quantify how transported particles are retained by the solid walls of the micro-structure up to clogging the individual pores imposing a feed-back on the transported suspension. The candidate will be trained in cutting-edge microfluidics and time-lapse video-microscopy techniques. The research work will involve collaborations with a suite of international colleagues across Europe and the US. Most of the PhD student's time will be dedicated to research, but contributing to some teaching activities can be discussed, including the additional possibility of supervising master students. Expected start date position: 01.01.2024 or upon mutual agreement. Contract duration up to 4 years.

The host facility The Environmental Fluid Mechanics Laboratory is an established facility, located at the Institute of Earth Sciences (ISTE) at the University of Lausanne, equipped with state-of-the-art technology including fully automated microscopes (fluorescence and confocal microscopy), dedicated clean room for micro-fabrication, Z-sizer for colloids suspensions characterization and a microbiology laboratory. The University of Lausanne is sharing the campus with EPFL, making the local environment very dynamical and stimulating. More information about the Environmental Fluid Mechanics Laboratory can be found at www.pietrodeanna.org

Application documents: i) motivation letter (1 page describing your background, research interests and past experience); ii) Curriculum vitae; iii) Contact information for one or two professional references.

The application documents must be submitted as a single PDF file via email to Prof. Pietro de Anna (pietro.deanna@unil.ch). Candidatures will be considered as soon as they will be received. Any questions can be directed to Prof. Pietro de Anna.