

Post-Doctoral position at GeoRessources Laboratory, University of Lorraine, France

Hydrodynamics and particle transport modelling in preferential flow

A Post-doctoral opportunity is available at GeoRessources laboratory, University of Lorraine, France, in the research field of Hydrodynamics and Transport Processes. Applications are invited for a 12 months contract to work on the development of original numerical approaches for the study of particle transport in preferential flows.

The role

The successful applicant will carry out fundamental and applied research within a team focusing on multi-scale Hydro-Geomechanics. The aim of this specific research project is: (i) to identify the mechanisms governing transport and deposition of particles in preferential flow through specifically designed experiments and (ii) to built up numerical models to better predict the dynamics of particles immersed in moving fluids using a multi-scale approach (contact dynamics, fluid mechanics, granular mechanics). The applicant will work in association with a PhD student who already started the experimental campaign and will focus on the numerical modelling. The work will consist in enhancing a numerical tool coupling a discrete element method (DEM) and a lattice Boltzmann method (LBM) for a better description of the hydro-mechanical processes involved in the problem (solid-fluid interaction, lubrication forces, particle interaction, etc...). The final goal is to characterize the conditions governing transport and deposition of immersed particles in order to better predict erosion or clogging phenomena in geological systems by investigating the influence of the particle properties (density, size, geometry) and of the flow topology (wavelength, amplitude and phase of the sinusoidal length of the walls) on the fluid mixture dynamics. Applications to fields of research like petroleum engineering or mineral processing could potentially be considered.

The applicant

Applicants should have a PhD in Computational Mechanics, Civil or Environmental Engineering or Geosciences. Backgrounds in Hydro-Geology, Fluid and Solid Mechanics, Applied Mathematics, Numerical Modelling and Programming will be appreciated. The successful applicant will demonstrate a strong commitment to academic research in the proposed field. He/she will have excellent written and oral communication skills. He/she will be willing to create and develop original approaches to tackle open questions.

Research environment

The PhD will be supervised by Dr M. Buès and Dr. L. Scholtès. The applicant will join the Multi-scale HydroGeomechanics (HGM) group at the GeoRessources Laboratory, a research center under supervision of both the CNRS and the Université of Lorraine. The HGM group comprises 8 academics and 10 postgraduate researchers. It is an emergent, vibrant and pro-active group in the fields of Geomechanics and Transfer in Porous Media. For its study, the applicant will benefit from dedicated experimental facilities as well as homemade and open source numerical codes.

The opportunity

It is a 12 months full-time position, partly funded by the ICEEL, a national research fund with a tax-free stipend of approximately €25,000/year. The position is available now.

Application

Applications should be sent by email to Luc Scholtès (luc.scholtes@univ-lorraine.fr). They should include a resume and a cover letter. In their cover letter, applicants are invited to include a short research statement (about 200 words) explaining how they understand the issues related to transport phenomena in porous media and the significance of solid-fluid interaction in the overall process.

Online info:

HGM: <http://georessources.univ-lorraine.fr/content/hydrogeomecanique-multi-echelles-0>

GeoRessources: <http://georessources.univ-lorraine.fr/>

University of Lorraine: <http://www.univ-lorraine.fr/>

CNRS: <http://www.cnrs.fr/>

ICEEL: <http://www.iceel.eu/fr/accueil.html>