

Research Topic for the Arts et Métiers ParisTech - CSC PhD Program

Subfield: Applied Physics, Porous media, Capillary effects

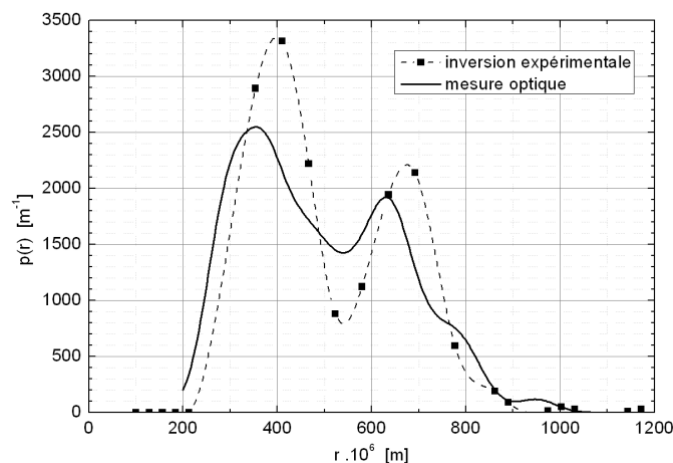
ParisTech School: Angers

Title: Experimental study of some capillary phenomena in porous media

Advisor(s): A. Ambari, S. Champmartin
Stephane.Champmartin@ensam.eu

Short description of possible research topics for a PhD: (10 lines in English + optional figure)

We want to study two of the main features involved in the capillary penetration in porous materials. In the first part, the characterization of the structure of a porous medium will be studied. For that purpose, a new porosimetry technique, based on the determination of the main moments of the pore size distribution, will be developed. The second part of the subject consists in studying the dynamic of the capillary rise at the scale of a single solid particle (a fiber or a sphere) or inside a single pore. An experimental setup will allow one to measure the instantaneous capillary rise and the capillary force exerted by the wetting liquid on the solid surface. The experimental results will be compared to analytical models for validation. This research project should answer to some questions on the fundamental ground and should also be useful in engineering (design of new methods for porosimetry and tensiometry).



Comparison of the experimental and optical pore size distributions (vitrified A10 silicate)

Required background of the student: the applying student must have a good background in Fluid Mechanics, Porous Media and Capillary phenomena, as well as good experimental skills

2-3 representative publications of the group:

- A. Oukhleif, S. Champmartin, A. Ambari, Yield stress fluids method to determine the pore size distribution of a porous medium, Journal of Non-Newtonian Fluid Mechanics 204, 2014
- B. Rodriguez de Castro, G. Malvault, A. Ahmadi Sénichault, D. Bruneau, S. Champmartin, A. Omari, On the Determination of Pore size distribution from Injection of yield stress fluids through model porous media, Interpore 2012.

FOR APPLICATION, PLEASE CONTACT ADVISOR(S) BY EMAIL WITH COPY TO:
ali.siadat@ensam.eu AND yvon.velot@ensam.eu