Postdoctoral position

Experimental study and modelling of the coupled multiphase fluid flow and geo-electrical resistivity in porous media: application to soil pollution monitoring

Job location: Orléans-France.

Start date: January/February 2020

Contract duration: 12 months

Application: Send CV, motivation letter and the names of two references to: j.daparis@brgm.fr ; h.davarzani@brgm.fr

Context and objectives

Identifying, monitoring and treating pollution caused by light refined petroleum hydrocarbons (gasoline, diesel, engine oil, etc.) is a major environmental issue. These pollutants are part of the LNAPLs (Light Non-Aqueous Phase Liquids) that are immiscible liquids lighter than water. At high concentration, they accumulate on the top of the aquifer and form a pure phase product called supernatant. Currently, diagnosis of such pollution is limited because it is usually carry out: i. by performing soil, gas and water analyzes as well as measuring the supernatant thickness; ii. extrapolating data between measurement/analysis points. The goal of the proposed work is to combine these methods with complex electrical resistivity in geophysics to characterize LNAPLs. The work will consist in laboratory measurements as well as numerical modeling to describe pollutant flow and relate it to the geophysical signal in order to estimate pollutant residual saturation in order to improve the supernatant recovery.

Work summery

- State-of-the-art on coupled multiphase flow phenomena (water/pollutant/air) and geo-electrical resistivity,
- Performing the experiences in laboratory in order to determine the relationships between fluid saturations and resistivity,
- Development of a numerical model using COMSOL Multiphysics for coupled multi-phase flow and porous media electrical resistivity in order to predict the complex hydro-geophysical behavior,
- Validation of numerical approach with experimental data.

Requirements

- PhD degree in Geophysics (Electrical/Electromagnetic methods) or in multiphase flow and transport in porous media or fluid mechanics
- Solid background in numerical simulation and interest in experimental works
- Fluency in English (writing scientific papers)
- Highly motivated and self-directed person

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Additional information

BRGM, the French geological survey, is France's reference public institution for Earth Science applications in the management of surface and subsurface resources and risks.

Its program focus on scientific research, supporting public policies and international cooperation.

The BRGM is one of the Carnot Institutes. It undertakes research under contract with industrial sectors and businesses of every size.