Post-doc open position at Laboratoire 3SR, Grenoble (France)

Research topic: Numerical modelling of thermo active geostructures. Application to an operational monitored case study.

Supervisors: Alice Di Donna and Fabrice Emeriault

Duration: 1 year

Expected starting date: first semester 2022

Research topic

Energy geostructures are geotechnical structures also used to exchange heat with the ground for heating and cooling of adjacent buildings, using a heat pump. The first application was that of energy piles, nowadays largely used in several countries. More recently, the technology has also been developed for infrastructures like metro stations and tunnels, underground parking and cut-and-cover tunnel, slabs. The significant advancements in the research on this topic are such that we are now ready for testing and implementation in our **cities**.

This project is a unique opportunity to monitor and investigate the behaviour of a **real scale energy infrastructure**. The work is based on the **existing case study** of a metro station, already constructed and fully equipped with ground heat exchangers in the diaphragm walls and slabs.

In the framework of this project, the structures, the air and the surrounding soil of the studied metro station will be **instrumented** with sensors and monitored during operational in real environmental conditions.

The role of the post-doc will be to develop a coupled **thermo-hydraulic model** of the metro station accounting for the real complex **hydrogeological context**, predict the response of the station in terms of heat exchange potential and temperature field under different scenarios, analyse the **monitoring data** and compare with the numerical results. The most affecting parameters will be also identified. Possibly, the behaviour of the geostructures from the **geotechnical** and mechanical point of view will also be investigated.

The post-doc position is part of a wider research action involving a number of academic and non-academic partners, with different roles. The post will have to interact and coordinate with all of them, and in particular with those in charge of the in-situ instrumentation and monitoring.

Candidate profile: we are looking for a candidate with a good knowledge on soil and concrete thermal behaviour, hydrogeology, thermo-hydraulic couplings in porous media, numerical modelling with FEM, soil mechanics, thermo-mechanical couplings. Experience with the software COMSOL Multi-physics will be positively evaluated.

Contact: If you are interested, please send us an e-mail with your CV at the following address: alice.di-donna@univ-grenoble-alpes.fr