Université de Liège
Faculty of Applied Sciences
Department of Architecture, Geology, Environmental & Civil Engineering
ArGEnCo

PhD studentship available in: "Numerical modelling of repository galleries in the context of nuclear waste disposal"

In collaboration with: the French national radioactive waste management agency (ANDRA)

Applications are invited for a PhD studentship to investigate multi-physical behaviour of deep repository galleries for nuclear waste disposal. Deep geological disposal constitutes one of the most promising solutions for the safe isolation of high-level and intermediate-level radioactive wastes. While the concept of disposal differs from one country to another, the insulation of the radioactive wastes from the biosphere always relies on a multi-barrier concept. Safety of the isolation is provided by a combination of natural (host rock) and engineered (canister, buffer and backfilling materials) barriers.

Researchers at the University of Liège are at the forefront of the numerical modelling of such galleries and interactions between all of these barriers. The PhD will simulate the whole life of repository galleries, including excavation, host-support interactions and sealing. Porous materials involved (soils, rocks, concrete) are partially saturated in water. They exhibit a non-linear behaviour especially under (thermo)-hydro-mechanical couplings. This work will be based on advanced constitutive laws (elastoplastic or visco-elasto-plastic) and numerical methods presented recently in several PhD theses.

The proposed project will be in collaboration with the French national radioactive waste management, providing experimental data from in situ laboratories. The project will be supervised by Pr. Charlier and Collin at the University of Liège. The team of geomechanics has a large experience on multi-physical modelling and has already held many national and European related projects. The successful applicant will integrate a team of several PhD, and postdoctoral researchers working on different challenging aspects of multi-physical couplings in geomechanics. He will use and improve the finite element code LAGAMINE developed in the team since the late 80s.

Applications are welcome from students graduated in the area of civil, geological, mechanical or physical engineering, geosciences or any other relevant field of study. The four year project will give the applicant many opportunities to develop many technical skills (advanced numerical methods, poromechanics, elastoplasticity…) and integrate into a dynamic network of universities and laboratories. The ability to communicate orally and write in English is desired and International mobility encouraged.

Applications should be submitted ASAP. Please email CV and cover letter to Robert.charlier@ulg.ac.be.

GEO³
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