Postdoc position in geomechanics

Multi-scale behaviour and damage of heterogeneous rocks around underground excavations

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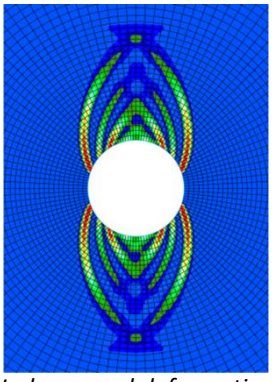
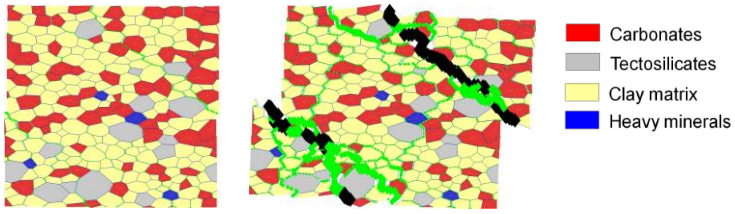
Project description

Objectives:

The goal of this project is to investigate the multi-scale behaviour of clay rock, going from microscopic to macroscopic scale. Rock materials are studied for various geological and geotechnical applications. Among them, deep geological structures and underground drillings require to predict the deformation, strength, and failure of the surrounding rock. The latter are of high importance and require a good understanding of the material behaviour. Based on experimental observations, clay rocks can exhibit a complex structure which is heterogeneous at different scales. The heterogeneity is observable at large macroscale but also at smaller levels of the material structure (from millimetric to microscopic scales). Various scientific questions have risen recently on how microstructural characteristics of heterogeneous materials can be considered at larger scale, and enrich macroscale modelling. Furthermore, the heterogeneity and anisotropy of clay rocks' properties have an influence on their behaviour.



Underground deformation and fracture



Microstructure deformation

Method:

The research will be based on multi-scale approach and numerical method allowing to model microstructure media in a double-scale framework (FEMxFEM). The objectives are related to: the consideration of heterogeneity and anisotropy, the predictions of deformation and rupture, and the hydro-mechanical behaviour of the damaged zone developing around galleries. The modelling requires taking into account microstructural information defined experimentally.

Candidate profile

The postdoctoral position is available at ENTPE-LTDS (Lyon, France). Applications are welcome from PhDs graduated in the areas of civil, mechanical, and materials engineering, or geosciences. PhDs in geomechanics / geotechnics are mostly welcome. A good knowledge of mechanics of porous media, constitutive modelling of geomaterials, and numerical methods is required. The 12-months project will give the applicant opportunities to develop various technical skills (advanced numerical methods, elastoplasticity, damage approach, poromechanics, etc.). The successful applicant will use and improve the non-linear finite element code LAGAMINE. The ability to communicate orally and write in English is required and international mobility is encouraged.

Application

Applications should be submitted before the end of April 2020 by emailing a CV, a PhD summary, publications references, scientific/academic references, and recommendation letter to the supervisor at benoit.pardoen@entpe.fr. Any additional document relevant for the application can also be transmitted, especially for international applications.