COLLABORATIVE RESEARCH CENTER 837

INTERACTION MODELING IN MECHANIZED TUNNELING

RUB

HYDRO-MECHANICAL BEHAVIOUR OF A PELLETS BASED BENTONITE SEAL: NUMERICAL MODELLING OF LAB SCALE EXPERIMENTS

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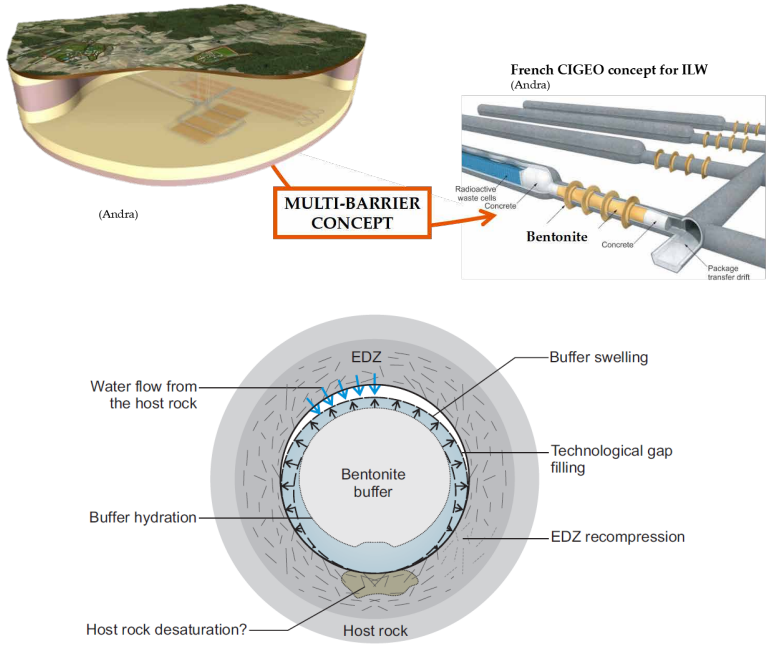

Hydromechanical processes affecting bentonite and the near-field of a repository for radioactive waste (Dieudonné et al. 2016)

Deep geological disposals have been selected by several countries as a reasonable option for the final management of high and medium-activity-level nuclear waste.

The confinement of the waste is ensured by the host rock and/or engineered barrier (EB). Among the other EB components, the role of bentonite is central. Bentonite presents very low permeability in saturated conditions and a certain swelling potential, namely swelling strain and swelling pressure development upon water saturation. It also limits radionuclides migration due to their retention capacity. In most of the concept designs, the bentonite is used to seal galleries and shaft. In this context, the volume of material needed is huge. As a consequence, the time required for the full saturation of the material can be extremely long (for example several thousand years are required for the full saturation of a bentonite plug of 10 m diameter and 20 m length in a clay formation). In order to assess the long-term evolution of a geological repository, a good prediction of the hydro-mechanical response of bentonite subjected to various boundary conditions is needed. In this work, the adopted modelling strategy is described: the Barcelona Basic model is considered for the bentonite mechanical behaviour, pressure dependence is taken into account for some mechanical parameter and the double porosity model proposed by Dieudonne' is used for the water retention behaviour. The numerical model appropriately captured the non-monotonic evolution of the swelling pressure during the hydration phase is well captured by this model, which is always a challenge for this type of problem.

Guests are welcome!

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