Study of the thermo-hydro-mechanical (THM) coupling of cement-treated materials

Cement-treated materials are a mixture of soil / granular material / recycled aggregate, cement, and water. They have been widely used in construction of stabilized rammed earth materials. Once the cement-treated material is mixed, the hydration process begins immediately, and the material undergoes a transition from the mixing state to skeleton formation until it finally hardens. During the hydration process, the thermo-hydro-mechanical behavior cement-treated material is changing all the time, presenting the transformation from soil-like granular material to cemented material.

Therefore, a novel thermo-hydro-mechanical analysis approach for the characterization of cement-treated materials will be elaborated in this study. To achieve this step, the thermo-hydro-mechanical properties with hydration process will be provided experimentally and analytically investigated. Finally, the structures constructed with this material will be numerically simulated in a finite element code. This study will provide the necessary elements to better design these structures considering its thermo-hydro-mechanical and its influence on the structural service life.

Application

To support this research program, we are looking for an outstanding and highly motivated candidate to pursue his or her PhD with our group. He or she will have a background with civil engineering, concrete material, soil mechanics, finite element Modeling.

Supervision

Pr. Aveline DARQUENNES and Pr. Hossein NOWAMOOZ are two members of the LGCGM laboratory (axis 5: Matériaux hétérogènes, fluides et transferts). They will supervise this research project. For more information please also consult our website: https://lgcgm.fr/recherche/5-materiaux-heterogenes-fluides-et-transferts.