IFSTTAR

Année universitaire 2012/2013

Internships 2013

Sustainability of soil mixing material - Duration 6 months

Direction scientifique (DS)
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Within the RUFEX research project that aims at studying the feasability and the sustainability of a soil improvement method based on soil mixed in place with cement.

Deep mixing is a general term for a large number of techniques in which binding agents are mechanically dispersed within the soil either in dry or slurry form using specially designed mixing tools.
Due to its technical and economical interest as the in situ soil is mixed with cement, there is an increasing interest in the use of this technique not only for soil stabilisation but also to construct temporary and permanent foundation/structural (load bearing) elements and excavation retaining walls. Despite the available knowledge on factors affecting the development of strength of in situ deep mixed soils, there are still no widely accepted dosage methodologies.

The internship is such that this research work mainly focuses on the physico-chemical properties of silica sand, silt and kaolinite stabilized with Portland blastfurnace slag cement in the laboratory and their effects on the mechanical response of the mixed materials

The effects of curing time and cement content, as well as the addition of bentonite and the presence of sulphates, effects of diesel and Nacl are investigated by means of unconfined compressive strength tests and ultrasonic pulse wave velocity measurements. The student will have to carry out DRX, MEB and porosity tests to analyse the microstructure.

The strength of treated soils submitted to cyclic wetting and drying before the cement hydration process is complete continues to increase. The stiffness also increases but is significantly affected by the formation of microcracks. The student will have to carry out DRX, MEB and porosity tests that also help analysing microstructure and chemical reactions
The effects of Desiccation by exposure to air due to the appearance of microcracking and the decrease in strength are studied on stiffness in the case of fined grained soils and kaolinite.

Most of the experiments will be carried out on laboratory samples. Nevertheless, a comparison will be made between laboratory mixed materials and in situ mixed materials in the case of field works in order to point out heterogeneities.

The student will have skills in geotechnical engineering, physico chemical properties of soil material and microstructure analysis.