

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Given names :

Status (prof., assistant prof., ...) :

Laboratory :	Laboratoire de Mécanique de Normandie (LMN) ZRR	Website address :	https://scanr.enseignementsup-recherche.gouv.fr/stru
Institution :	INSA ROUEN NORMANDIE	Website address :	http://www.insa-rouen.fr

Scientific competence of the supervisor:

Soil mechanics, Unsaturated soils, Wind turbine foundation, Soil liquefaction, Geotechnical uncertainty, Reliability and risk analysis for geotechnical structures, Soil-structure interaction, Raw earth concrete, Design of Experiments

Two major publications in the field proposed for the PhD :

1. Huang W.H., Shamas Y., Tran K.H., Imanzadeh S., Taibi S., Fleureau J.M., De Cursi, E.S., 2025a, Predictive modeling and experimental assessment of static Liquefaction potential in unsaturated sandy Soils,
2. 3. Tran K.H., Shamas Y., Huang W.H., Imanzadeh S., Taibi S., Fleureau J.M., Hattab M., Souli H., Rivoalen E., 2024, Threshold of saturation degree of unsaturated sand to cause liquefaction considering the sample

Website address of the personal page :

Supervisor's email :

Description of the research work proposed for a PhD

Topic # (see list) :

Title :

Subject :

The production of renewable energies requires the construction of stable and efficient civil engineering structures. In the case of wind power, tall wind turbines are structures subject to cyclic loading (wind, ocean waves, stop and start effects) on the superstructure and transmitted to the soil via the foundation. Repetitive actions should be addressed by considering cyclic and dynamic effects and the consequences of modifications in soil stiffness, soil liquefaction and continued movement (creep). Regarding the soil liquefaction, this is a phenomenon in which granular soils under cyclic load lose much of their resistance or strength and behave like a liquid. The reason is that loose sands tend to be compacted when subjected to dynamic loading that results in an increase of the pore water pressure and a decrease of the effective stress within the soils. When soils liquefy, the deformation develops rapidly and causes the collapse of infrastructure on a large scale. Recent studies have shown that liquefaction on saturated soil but also on unsaturated soils. However, their behavior has been little studied and poorly understood. Objectives are: (1) Experimental study of the impact of non-saturation on soil liquefaction resistance and residual resistance after liquefaction, (2) Study of suction - liquefaction potential relationships in unsaturated soils, (3) effect of initial stiffness and density (4) Modeling the behavior of wind turbine foundations on unsaturated potentially liquefiable soils.

Keywords :

Unsaturated soils, foundations, Soil liquefaction, Cyclic loadings, Experimental laboratory study, Numerical modeling, Soil structure interaction, Soil stiffness, Soil suction, Risk, Phenomenological law of soil behavior, Wind turbine field

Expected collaborations :

This research subject will be carried out in collaboration with a research laboratories network, specialized in the behavior of unsaturated soils under dynamic solicitations, belonging to establishments such as CentraleSupelec, L'ENISE de Saint Etienne and Le Havre Normandy University. In addition, collaboration with organizations such as CEREMA and INCT-Infra Universidade Federal do Ceará (UFC), Brazil will provide in situ expertise.

Background required from the applicant :

The applicant must have a civil engineering training level Bac + 5 (Master of Science). Good knowledge in soil mechanics, geotechnical engineering and numerical modeling of soil behavior will be appreciated.

Existence of a PDF file detailing the proposal ("yes" or "no") :

(see guidelines on the website www-csc.utt.fr)