

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 : Website address :

Institution : Website address :

Scientific competence of the supervisor:

constitutive modeling of unsaturated geomaterials, stability and bifurcation modeling in geomechanics, FEM developer

Two major publications in the field proposed for the PhD :

1.
2.

Website address of the personal page :

Supervisor's email :

Description of the research work proposed for a PhD Topic # (see list) :

Title :

Subject :

Nowadays, many landslides triggered after rainfall events cause many damages and victims in urban area. On 21 March a landslide killed 12 people in Papua New Guinea. In December 2013, a landslide in the center of Lyon (2nd largest city in France) caused major damage to roads and the Lyon National Conservatory of Music. The complex hydromechanical behavior of soils is still not yet well understood. Due to this complexity, many kinds of material instability can develop inside the plasticity limit. Nevertheless, the second order work criterion allow a good description of these instabilities for the case of saturated soils. But the development of instabilities of a soil layer in a saturation process is still not yet well understood. In particular, the anisotropy of the capillary tensor is not described in general. In order to tackle this problem, it is proposed trough this subject to revisit the concept of effective stress in unsaturated soils. A literature review will be made on a thermodynamic approach and on the last advances with the DEM method. Then, based on this literature, an improvement of the constitutive model developed at INSA de Lyon will be proposed and implemented in a FEM code. Eventually, a discussion about the expression of the second order work criterion in unsaturated soils will be done. A proper stability criterion will be deduced at the local scale (Gauss point) and at the boundary value problem scale in order to propose a generalized safety factor.

Keywords :

landslide modeling, unsaturated soils, finite element method, stability criterion, safety factor.

Expected collaborations :

Dr. J. Duriez from INRAE Aix-en-Provence, Dr. A. Fabbri from ENTPE Lyon

Background required from the applicant :

The candidate must have good skills in soil mechanics, mechanics of continuous media. Skills in numerical methods and finite elements analysis are a plus.

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

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