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 : MEFTAH Given names : Fekri

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

Laboratory :	Laboratoire de Génie Civil et Génie Mécanique	Website address :	https://lgcgm.fr/
Institution :	INSA Rennes	Website address :	www.insa-rennes.fr

Scientific competence of the supervisor:

Multi-physics and multi-scale modelling
Advanced finite element modelling of materials and structures
Mechanics and durability of materials and structures
Probabilistic methods in engineering

Two major publications in the field proposed for the PhD :

1. M. Moussa, A. Fliscounakis, K. Ferradi, F. Meftah, Technical report on Osserain's Bridge, 2023.
2. M. Moussa, A. Fliscounakis, M.-K. Ferradi, F. Meftah, Méthodes d'analyse limite pour l'estimation de la charge de ruine des constructions maçonnées : enjeux des approches non-associées, JNM, 2023.

Website address of the personal page :

Supervisor's email : Fekri.Meftah@insa-rennes.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** IV-6, IV-12, VI-2

Title : A reliability approach of the assessment of the failure of masonry and RC structures based on limit analysis and computational discrete modelling

Subject :

Investigating the failure of either concrete or masonry structures is a major ongoing issue in civil engineering. For this purpose, limit analysis is a valuable method that allows to estimate the bearing capacity and to determine associated failures mechanisms of loaded structures with a relatively reasonable computational cost since in such an approach there is no need to address their full non-linear response. However, one major issue is that the involved modelling parameters usually present random variability of their values. For each parameter, the dispersion may concern either its uncertain characteristic value to be considered in the analysis or its spatial inhomogeneity. Therefore, the impact of this uncertainty on the limit analysis prediction needs to be evaluated. The aim of the proposed Ph.D thesis project is to investigate the sensitivity of failure load and associated kinematical mechanism to the variability of needed modelling parameters (geometry, material properties, boundary conditions, loadings, assumed failures patterns…). For this purpose, probabilistic methods will be adopted and coupled with an already developed discrete limit analysis computational model (DLACoM). Then, the approach will be dedicated to investigating the probabilistic safety of (i) Masonry structures made of infinitely resisting blocs, (ii) Renforced concrete beams failing in shear by assuming a priori sets of explicit failure patterns.

Keywords :

Limit analysis, Failure analysis, Probabilistic reliability, Load bounds and failure modes, Masonry and RC structures

Expected collaborations :

Yes

Background required from the applicant :

Advanced methods of structural analysis (Plasticity theory, Limit analysis and load bounds, Fracture analysis) – Structural design and analysis of structures (RC, masonry…) – Numerical methods in engineering (Finite element method…) – Applied mathematics (Variational methods in engineering) – Applied Statistics & Probabilistic Methods in Engineering – Matlab and Python Programming.

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

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