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 : Darquennes | Given names : Aveline

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

Laboratory : Laboratoire de Génie Civil et Génie Mécaniques (LGCGM) | Website address : https://www.insa-rennes.fr/lgcgm.html

Institution : INSA Rennes | Website address : https://www.insa-rennes.fr

Scientific competence of the supervisor:

he supervisor's research work is focused on the experimental modeling of the behavior of cementitious materials undergone physicochemical and mechanical stresses. More specifically, the work is related to the: (1) Study of early and long-term behavior of cementitious materials : formulation, microstructure, delayed deformations, cracking, scale effects ; (2) Durability and resilience of cementitious materials by incorporation of mineral additions: formulation optimization, physicochemical characterization, transfer properties and mechanical behavior, aging and post-exposure resilience, performance indicators for the repair of structures.

Two major publications in the field proposed for the PhD :

1. Darquennes, A., Staquet, S., Delplancke-Ogletree, M.-P., Espion, B., 2011, “Effect of autogenous deformation on the cracking risk of slag cement concretes”, Cement and Concrete Composites, 33, pp.368-379.
2. Darquennes, A., Olivier, K., Benboudjema, F., Gagné, R., 2016, “Self-healing at early-age, a way to improve the chloride resistance of blast-furnace slag cementitious materials”, Construction and Building Materials, 113, pp 1017-

Website address of the personal page : http://adarquen.perso.insa-rennes.fr

Supervisor's email : aveline.darquennes@insa-rennes.fr

Description of the research work proposed for a PhD — ***Topic # (see list) :*** IV-7

Title : Durability of Alkali Activated Materials

Subject :

The proposed research work focuses on the behavior of materials with 100% mineral additions, the alkali-activated materials. More specifically, the main objective of the PhD consists in studying and understanding, by means of an important experimental campaign, the durability of alkali-activated materials under aggressive environmental conditions. The experimental campaign will first focus on the activation process of blast-furnace slag and fly ash to design mono- and bi-additions mixtures, and secondly on the corrosion risk of alkali activated materials due to the chloride penetration and carbonation. An appropriate methodology will be developed to determine the chloride penetration and carbonation resistance of alkali activated materials by means of accelerated tests. The corrosion initialization process will be monitored on reinforced concrete specimens under aggressive environmental conditions (CO2, Cl-) using the impedance spectrometry technic. The proposed experimental campaign will provide innovative information on the corrosion risk of alkali activated materials, on their resistance to the penetration of aggressive agents, as well as on the conditions needed to initialize corrosion.

Keywords :

Mineral Additions, Chemical Activation, Delayed deformations, Carbonation, Chloride diffusion, Corrosion, Experimentation, Civil Engineering

Expected collaborations :

Background required from the applicant :

Experience in Civil Engineering, a strong taste for laboratory experimentation, material science

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

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