Master 2 internship offer 2022-2023

Institut Pascal, Clermont-Ferrand

Performance of vegetal concrete confined with natural FRCM composite under axial compression

Background

In recent decades, vegetal concretes have attracted great interest from the civil engineering research community. Besides their low environmental footprint, these materials have interesting thermal, acoustic and hydric properties. However, their mechanical performance is low compared to the materials commonly used in construction (reinforced concrete, wood...), which limits the attractiveness of vegetal concretes in construction. This topic aims to overcome this weakness by proposing a strengthening solution using materials with good mechanical properties.

Project

FRCM (Fabric Reinforced Cementitious Matrix) composites wraps could be applied to cylindrical/cubic hemp concrete specimens in order to provide a confinement effect and improve compressive strength and ductility. The choice of these FRCM composites is justified by their good adhesion to the vegetal concrete and their good temperature resistance in contrast to polymer-based composites. The main objective of this internship is to evaluate the feasibility of compressive strengthening of hemp concrete. Compression tests will be performed to evaluate the effect of strengthening on the stiffness, load capacity, ductility, failure mode and cracking of material. A parametric study will be conducted to evaluate the effect of the number of reinforcement layers, the textile pre-impregnation and the addition of short fibers to the FRCM matrix on the mechanical behavior of composite.

Planned work

- Bibliographic study,
- Fabrication of specimens,
- Carrying out of the tests,
- Critical analysis of the results.

Profile

Student of Master 2 or engineering school, in the field of civil engineering or mechanics of materials, motivated by experimentation.

Work conditions

Location: Institut Pascal, Campus Universitaire des Cézeaux, 4 Avenue Blaise Pascal, Aubière.
Scholarship: 15% of the hourly social security ceiling.
Duration: 5 months, starting in February 2023.

Supervision

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