

## Effectiveness of confining recycled aggregates concrete using bioresourced composite by comparison to traditional ones

Elhem GHORBEL<sup>1</sup>, Mariem LIMAIEM<sup>1,2</sup>

<sup>1</sup> Université Cergy Pontoise Paris Seine, Laboratoire de Mécanique et de Matériaux de Génie Civil, Cergy, France, mariem.limaie@etu.u-cergy.fr, elhem.ghorbel@u-cergy.fr ; <sup>2</sup> Université de Tunis El Manar, École Nationale d'Ingénieurs de Tunis, Laboratoire de Génie Civil, Tunis, Tunisie, oualid.limam@enit.utm.tn;

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### ABSTRACT:

This research investigates the performance of concrete confined using either commercially Unidirectional Carbone Fiber Reinforced Epoxy Polymer “UCFRE” provided by SIKA Company or Unidirectional Flax Fibers Reinforced Bioresourced Polymer “UFRBP”. The concretes under study are C35/45 resistance class formulated using natural aggregates (control formulation) and recycled aggregates provided from demolition wastes. The main objective is to evaluate the effectiveness of confining recycled aggregates concrete using bioresourced composite by comparison to traditional ones.

The first part of this study is dedicated to the characterization of the both resins (determination of the gel point and reticulation duration, glass transition temperature and mechanical behavior) and the unidirectional composites (mechanical characteristics).

The second part is devoted to the experimental study of concretes loaded under compressive tests. The effect of three replacement ratios by mass of natural aggregates by recycled ones is studied (30%, 50% and 100%). It is shown that the effectiveness of confining with UFRBP requires applying two layers of composites instead of one for UCFRE. Moreover, confining the recycled aggregates concretes allows the enhancement of their compressive strength, stiffness as well as their ductility whatever the composite used. For replacement ratios higher than 50% both composites lead to comparable characteristics while for lower replacement ratios UCFRE is more effectiveness than UFRBP.

Using Bioresourced composite for concrete confining seems to have excellent performances comparable to Carbone one which encourages its application for concrete structures in civil engineering.