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INFLUENCE OF THE FIBER ORIENTATIONS ON THE FRACTURE OF FIBER CONCRETE

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ABSTRACT

In fiber concrete the mechanical properties are partly determined by the orientation and alignment of the fibers. In the poster, the fracture of beam specimen subjected to a three point bending test is compared to the fiber orientations. The beams are cut from a fiber concrete plate and the fiber orientations are measured by x-ray computed tomography.

Keywords: fiber orientations, fiber concrete, fracture, x-ray tomography, bending test.

INTRODUCTION

Fiber concrete is becoming increasingly popular as a construction material, as it can potenially form a ductile concrete. The properties of the fiber concrete depend on the concrete recipe, the flow of the fresh concrete into the formwork, possible vibrating of the concrete and the fiber orientations (Herrmann, 2016).

Fiber orientations in concrete are difficult to measure, it can be done in the hardened concrete using x-ray computed tomography (Suuronen, 2013; Herrmann, 2016) or analysis of slices of fiber concrete (Eik, 2013). Results of the x-ray computed tomography analysis of beam specimen cut from a plate will be presented, an example of a tomography image can be seen in Fig. 1.

These beam specimen are subjected to a three point bending test and the results will be compared to the fiber distribution and a recently proposed theoretical model (Herrmann, 2016). The comparison of the bending test will also be done with respect to the fracture pattern and fiber orientations.

RESULTS AND CONCLUSIONS

The results from the bending tests show that the presence of the fibers influences the fracture path. Both, amount and orientation of the fibers are relevant in this respect and can alter the crack path compared to unreinforced or rebar reinforced concrete.

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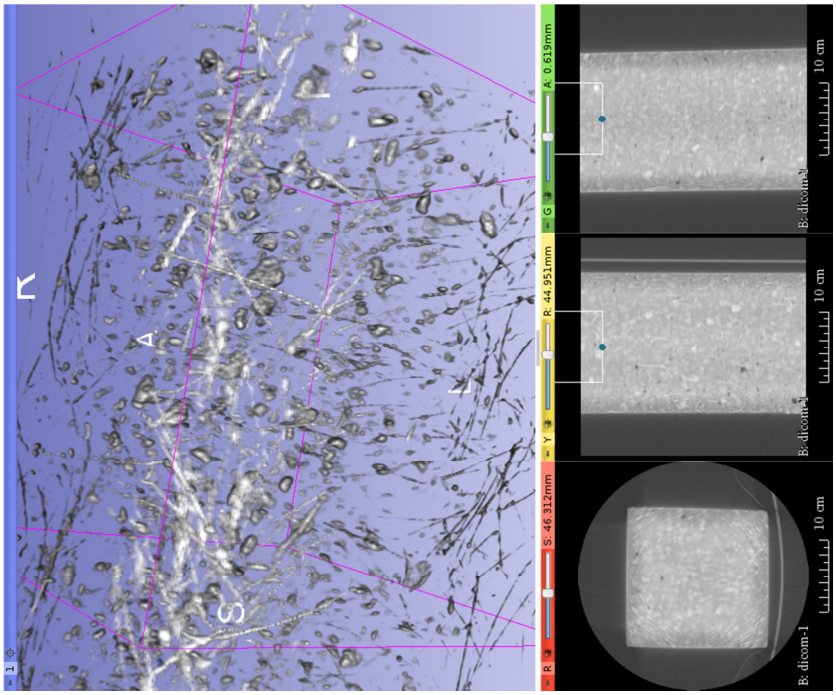

Fig. 1 - Thresholded volume image and three orthogonal slices of an x-ray computed tomography scan of a fiber concrete sample

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