Computational Mechanics Group
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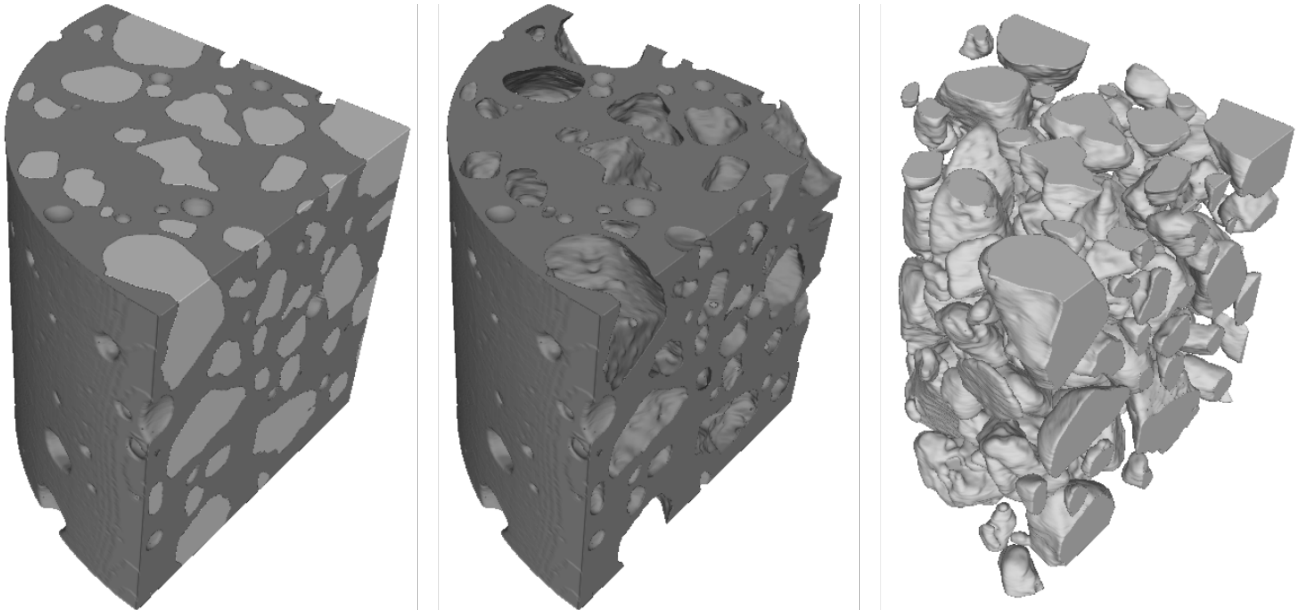
Topic proposal

Computed tomography and in-situ mechanical testing for the fracture behavior of complex heterogeneous materials

X-ray tomography is a 3D imaging technique which enables the visualization of material samples including their inner structure with pores, voids, possibly heterogeneous constituents, as well as cracks, at different levels of resolution and scale. Through its combination with in-situ load testing, it is possible to visualize the changes to the inner structure including the nucleation and propagation of cracks under increasing load.
In this thesis, we aim at carrying out in-situ testing of stable fracture in concrete with X-ray tomography and digital volume correlation. The objective is to compare the experimental observations with predictions of an already available high-fidelity model for concrete including its real mesostructure obtained directly from the X-ray tomograph. The model is able to clarify the role played by aggregate geometry, porosity geometry and mortar properties on the crack path and on the observed load-displacement behavior.



Figures: Concrete mesostructure from X-ray microtomography.

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