Mesostructural modelling of the mechanical behaviour of recycled aggregate concrete

PhD student
Qifan Ren

PhD program
Civil Engineering (IST, University of Lisbon)

Supervisor
Jorge de Brito (CERIS, IST, University of Lisbon)

Co-supervisors
João Pacheco (c⁵Lab; CERIS, IST, University of Lisbon) and Jianhua Hu (Columbia University Mailman School of Public Health)

Period
2019-2024

Funding
Financial support from China Scholarship Council

Summary

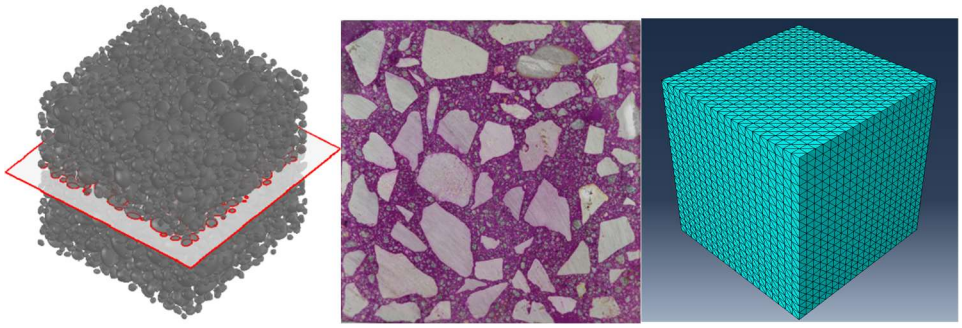
This PhD intends to build a mesoscale model of recycled aggregate concrete and investigate its mechanical behaviour by finite element method. The geometric model will consider the random properties of aggregates, e.g. location and shape, as well as the distinct properties of recycled aggregates, e.g. adhered mortar and three interfacial transition zones (ITZs).

A digital image technique is used to calibrate the geometric model through the comparison of real and virtual specimens. The mesoscale model will assign predefined parameters for each component to study compressive and tensile behaviour.

Furthermore, this project will investigate the effect of adhered mortar and ITZs, to ensure a realistic representation of recycled aggregate concrete in mesoscale models. The ultimate goal of the thesis is facilitating the mix design of recycled aggregate concrete.

Keywords

Recycled aggregate concrete, heterogeneity, 3D mesoscale modelling, mechanical behaviour, failure analysis.



Mesoscale modelling and calibration.