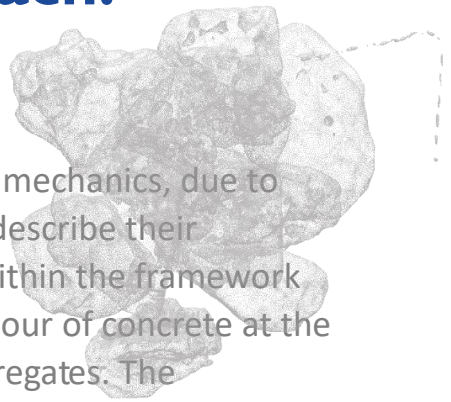
Constitutive Models for Concrete Materials in Meso-Scale approach.

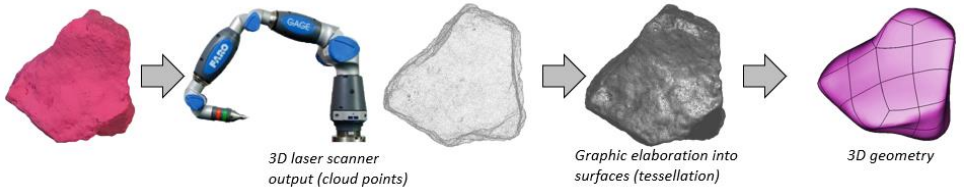


Introduction

Modeling the post-peak behaviour of brittle materials like concrete is still a challenge from the point of view of computational mechanics, due to the strong nonlinearities arising in the material behaviour during softening and the complexity of the yield criterion that may describe their deformation capacity under generic triaxial stress states. A numerical model for plain concrete in compression is formulated within the framework of the coupled elasto-plastic-damage theory. The aim is to simulate via the Finite Element (FE) method the stress-strain behaviour of concrete at the meso-scale, where local confinement effects generally characterize the cement paste under the action of the surrounding aggregates. The mechanical characterization of the components are accomplished through a specific experimental campaign.

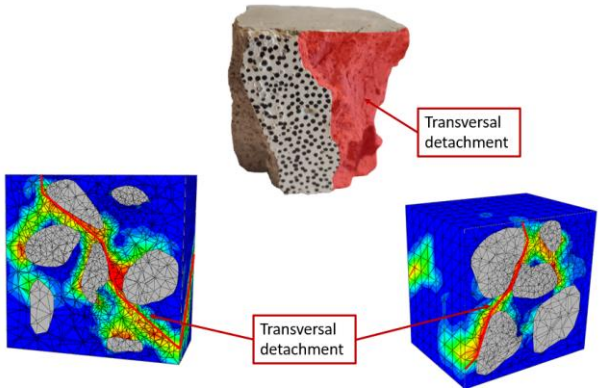
Objectives

The aim of the Thesis is to develop or using elasto-plasto-damage models for brittle materials at meso-scale level (an explicit inclusions representation into the samples).



You will learn to

- Develop or using non-linear constitutive model for brittle materials.
- Develop or using cohesive contact mechanics algorithms.
- Increase the knowledge about ABAQUS user subroutines.
- Increase the knowledge about 3D CAD, 3D scan and industrial tomography.
- Develop 3D models in meso-scale starting from tomography scan.



Requirements

Basic knowledge of FEM simulations.