

The student Alba Navarro Casanova has spent her internship at the CIMNE during the period 19/04/2017 – 31/07/2017.

During these months the student has been working on the validation of experimental tests on concrete samples with the Material Point Method.

The activity of the student has been organized in order to understand, firstly, the methodology:

- the theory of the MPM, a continuum-based particle method and the use of the in-house open source code implemented in Kratos Multiphysics framework;
- the study of damage constitutive laws, in particular the Simo-Ju damage law which can be used to model the failure of concrete material in finite strain regime;
- a literature review on the application of the MPM for the modeling of failure in concrete.

For the validation study an experimental work which investigates the compression, tension and shear strength of concrete has been considered.

The student used the pre- and post-process GiD to create 2D and 3D numerical models and analyze the numerical results. These ones have been compared with available experimental data and numerical results obtained with a discrete technique, the Discrete Element Method.

Lastly, some limits of the numerical model have been identified and possible solutions, which can be developed in the future, are individuated.

For the fulfillment of the final objective, the student reached a good level in using the GiD pre- and post-process and the open-source MPM application implemented in Kratos Multiphysics. She learnt basic knowledge of damage constitutive laws defined within the finite strain regime and acquired some experience in the validation analysis, i.e, comparison of the results with experimental data and numerical results which have been obtained with a different technique.