Description of doctoral project and research results achieved to date

In this research, a pore-scale model is being developed to simulate flow of water and the movement of individual grains in a bed of swelling particles. The material of interest is absorbent polymer particles that are used in hygienic products. To gain insight in the process of swelling and the transport of water, a pore-scale model is being developed. For this purpose, we use a particle model, Yade-DEM, to simulate the movement of individual particles inside a packing during deformation. We have implemented in Yade-DEM the ability of particles to swell such that we can simulate the swelling of a bed of absorbent particles. Moreover, we have coupled Yade-DEM with a pore-unit model which is capable to simulate two-phase flow. Currently, we are comparing simulations on dynamic imbibition to experimental data from literature.