Pore network modeling is one of the most powerful tools that can be used in order to simulate multi-phase flow in a porous medium. However, the experimental verification of pore-network models needs to be present in order to evaluate the numerical models. In this work, a pore-network model based on Delaunay triangulation has been developed in order to simulate two-phase drainage and imbibition in a two-dimensional micro-model. The same pore network has been used to design the flow network of a real representation of a porous medium, a micro-model. Quasi-static numerical and real experiments have been conducted and the results were compared in order to test the validity of the numerical model and to calibrate the parameters of the experimental setup.

**Results**

Using numerical results for capillary pressure, saturation, and interfacial area, Pc-S-awn surfaces were constructed for drainage and imbibition. Results are shown in figures 3a and 3b.

![Figure 3. Pc-S-awn surfaces for imbibition (a) and drainage (b).](image)

The relative difference between the two surfaces was found to be around 10%. By changing the number of pore bodies, or the distribution of sizes of the pore bodies in the network, the difference could be reduced to 2%.

Images were acquired from the micro-model during drainage, under quasi-static conditions. From these images, the saturation of each phase could be determined. In this way, the Pc-S curve could be constructed. This curve can be shown in figure 4. No Pc-S-awn surfaces are yet available, as that requires performing many (scanning) imbibition and drainage experiments, which have to be carried out yet.

**Discussion-conclusion**

The resulting curve is compared with the Pc-S curve obtained from numerical simulations, as shown in figure 4. Clearly there is a good agreement. It must be mentioned that some tuning of the parameters employed in the numerical model, like the variance and the mean value of the log-normal size distribution, was done in order to improve the agreement with experimental results.

![Figure 4. Pc-S curves for numerical model and experiment.](image)

This agreement verified that the numerical model represents the micro-model adequately. In future work, transient two-phase flow experiments will be performed in order to test the applicability of the new extended theories of two-phase flow.