

## Use of advanced CFD tool to characterize hydrodynamic of commercial UF membrane module

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### ABSTRACT

The fouling and the clogging are the main reported issues in the ultrafiltration. If the raw water quality and membrane materials play an important role in the fouling, process design contributes significantly in the overall process performances. To improve the characterisation and the design of the membrane process, the computational fluid dynamics (CFD) modelling has been used to estimate the distribution of hydrodynamics values in the connection box and the UF module. The results of the CFD modelling indicate that the design of the module implies hydraulic path heterogeneities within the connection box mainly due to the permeate outlet, which creates vortex zones at the opposite side to the raw water inlet. However, these pressure heterogeneities would not impact membrane fouling since the pressure headlosses in the modules provide a pressure equilibrium along the fibers. Regarding the risk of clogging due to low recirculation velocity, only 2% of the fibers located in the vortex zones are concerned. In conclusion, this preliminary study proved the benefit of the CFD to validate the design of the module but this approach remains too global to include local interactions between the water and membrane material, which contribute to the fouling and consequently to the process performances.

*Keywords:* Membrane; Design; Modelling

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