

Modeling and optimization of raw wastewaters dynamic filtration for water reuse

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Résumé : This thesis project is part of the WOc WoD (Water on Demand project financed within the Water Occitanie key challenge initiative of the Occitanie Region). The project aims at studying filtration systems for proposing efficient and robust decentralized treatment plants for producing water of high quality for REUSE.

More specifically, the PhD aims at studying a membrane filtration system said "dynamic", to produce sanitized water from raw wastewater. This system should allow i) to treat water as close as possible to its use by testing these systems in decentralized configurations, ii) to preserve the nutrients naturally present in wastewater.

The main technical limitations to allow its effective deployment in water reuse systems are limited knowledge of

- the behavior of this type of process with respect to numerous undesirable compounds such as organic contaminants, antibiotic resistance genes, microplastics, even though preliminary results show a good retention capacity;
- operating conditions allowing to reach a compromise between the quantity of filtrate produced and the clogging of the membranes at an acceptable cost.

To study these questions, the development of dynamic models will be supported by an experimental component: the thesis will focus on i) proposing dynamic models of the behavior of typical undesirable contaminants (whose identification is an integral part of the thesis subject by relying on the experience available on the characterization of wastewater of a village like Murviel Les Montpellier, in particular within the framework of the ALLEA project led by the the partner from IEM) and their fate in a dynamic raw water filtration system and ii) developing strategies to control the clogging of the rotating membrane in order to maximize performances while minimizing functioning costs.

Axe(s)/Domaine(s) d'applications(s) du réseau/TRL : Filières / REUSE rurale, REUSE urbaine