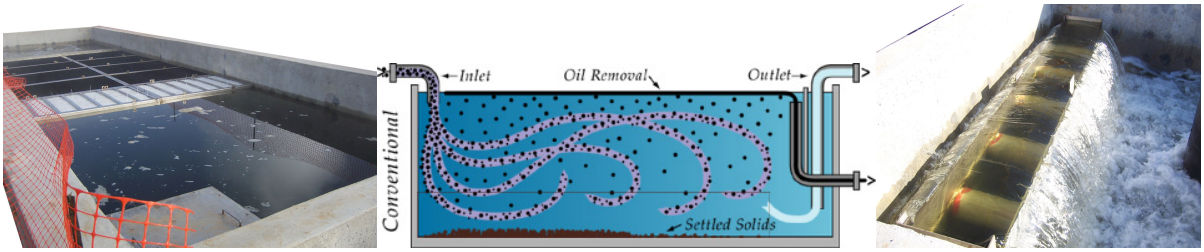
CORIA UMR 6614 CNRS, University & INSA of Rouen, Normandy
Avenue de l'Université - 76801 Saint-Étienne-du-Rouvray cedex, France

Subject : **« Study and optimization of wastewater treatment devices on the concept of a simplified electro-hydrodynamic/gravity separator»**

This project concerns the study and numerical design of an efficient system for the removal of suspended particles in dispersed phase from another phase in continuous mode, which is a situation frequently encountered in many industrial applications. In particular, water-oil separation (WO) procedures are of significant importance in industrial chemical operations, petroleum and biomedical industries, as well as in environmental processes such as the removal of oil droplets from any current water, including rivers, storm water and industrial wastewater. Water-oil separators are designed to remove various undesirable substances such as floating oil, grease, solid decantables and oily coatings from mixtures associated with many types of industrial installations (see Figure 1). They can be installed below or above the ground to help these installations comply with the regulations in force.

This project is aimed in particular at emulsion separation systems based on gravitational and electrical demulsification. Higher energy efficiency of these systems could be achieved by optimizing all system parameters, such as the direction of flow and flow, as well as the strength of the electric field. The complete understanding of the physical phenomena involved and the numerical modeling of the electro-hydrodynamic behavior of the liquid-liquid system are then necessary to optimize the parameters of the multiphasic system.

The objective of the project is to use numerical tools to study these flows. We will study both developed in-house code based on SPH (Smoothed Particle Hydrodynamics) method and open-source software, based on VOF (Volume of Fluid) technique. Cross-validation will therefore be done by comparing the obtained code-code results in digital solutions as well as existing analytical correlations. At the end of the proposed project, we expect the main results to: (i) a much better understanding of the (electro) hydrodynamic behavior of bubbles suspended in a liquid medium, (ii) the determination of optimal conditions for the phenomenon coalescing droplets, (iii) solutions to improve the separation of WO emulsions that could lead to the implementation of the next generation of intelligent demulsification devices.



Supervisors : Mostafa SAFDARI-SHADLOO, Abdellah HADJADJ

Tél. (+33)02 32 95 97 94 – Mail : msshadloo@insa-rouen.fr