NUMERICAL PREDICTION OF GAS HOLDUP IN DISSOLVED AIR FLOTATION (DAF) FOR RESOURCE RECOVERY

Introduction

The dissolved air flotation (DAF) process is a promising separation process that can be useful for resource recovery purposes. However, the complex interplay between liquid hydrodynamics, particles and gas bubble size make that the DAF process is not yet well understood. Advanced modelling can assist to better understand the fundamentals of a DAF. To bring the technology readiness level of DAF to ready for the market, the knowledge gap in fluid mechanisms of flocculation and hydraulic performance in DAF will be addressed based on computational fluid dynamics (CFD)

Methodology

CFD is a powerful tool that uses numerical analysis and data structures to analyze and solve problems that involve fluid flows. People at every level across diverse industries are getting great value from CFD analysis. This work will address the multi-scale problem in DAF by determining the drag force properly, which drives the evolution of mesoscale structures, e.g., the particle clusters or the bubble coalescence in DAF. PBM, another powerful modeling framework for the prediction of the dynamics of particle or bubble size distributions, will be integrated into CFD. By considering size distribution, the CFD-PBM has a better simulation precision compared to that of the mono size simplification.

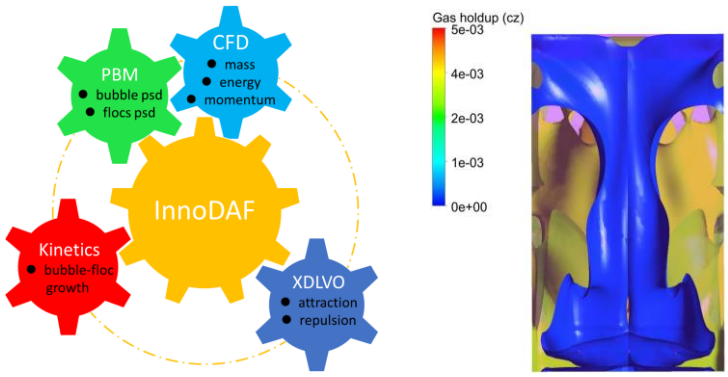

Figure 1 – Model-based design and prediction of gas holdup in contact zone of DAF.

Objectives of the thesis

The objective of the thesis is to use a coupled CFD-PBM model to investigate the impact of particle and bubble size on gas holdup among others and combine this with experimental data collection for model validation.

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BACKGROUND

L&W, M, C&B

LANGUAGE

English

MORE INFO

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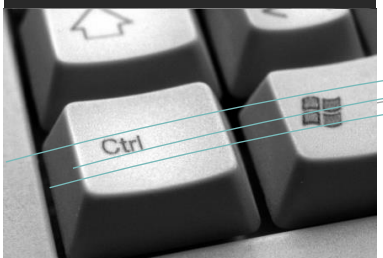

MARIE CURIE ACTIONS

CAPTURE

BIOMATH