TOWARDS IMPROVED DESIGN OF HIGH-RATE ACTIVATED SLUDGE SYSTEMS AS A KEY TOWARDS ENERGY POSITIVE WASTEWATER TREATMENT

Introduction

The high-rate activated sludge (HRAS) system is a key technology for moving towards energy positive wastewater treatment practices as it is suitable to maximize recovery of energy (carbon) as sludge for biogas production. However, separation of the sludge flocs from the bulk flow is still an important bottleneck in full-scale application. The efficiency of this separation step is known to be highly dependent on the flocs size, shape and density. Understanding more thoroughly floc formation processes and its influencing factors (e.g. tank hydrodynamics, chemical dosing,…) is a crucial step to design and operate the HRAS system in a reliable way.

Methodology

In this thesis, we will combine experimental work and Computational fluid Dynamics (CFD). CFD discretizes the domain into a three-dimensional computational grid and Navier-Stokes equations are solved at each grid point to simulate the flow field. CFD-modelling is a valuable tool to visualize these regions with high and low shear rates which aids in understanding (de)flocculation mechanisms throughout the bioreactor

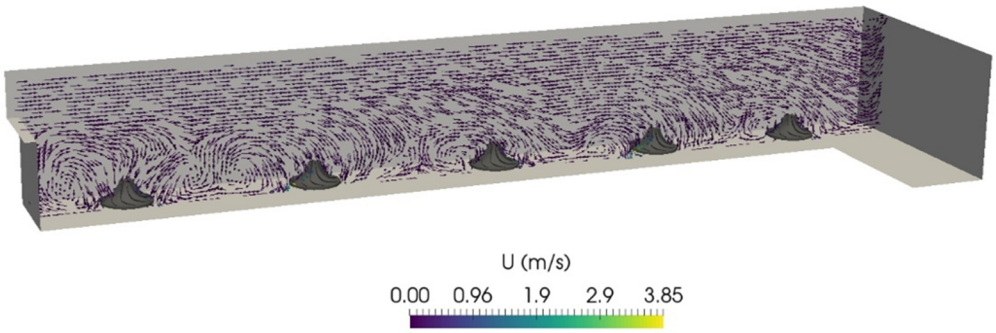

Figure 1 – CFD simulation of the anoxic section of the HRAS system, located at resource recovery facility of Breda (The Netherlands) and operated by the Waterboard Brabantse Delta.

Objectives of the thesis

The aim of this thesis is to explore the impact of the tank hydrodynamics on the floc formation process in a full-scale HRAS reactor, located at the Water Resource Recovery Facility of Breda (The Netherlands). The student will have the opportunity to work in close collaboration with Waterboard Brabantse Delta (www.efgf.nl) and gain experience in advance modelling methods.

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BACKGROUND
C&G, L&W, M, C&B

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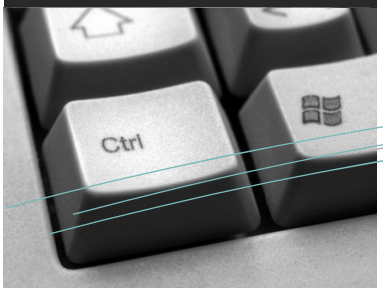

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BIOMATH