DEVELOPING AN INNOVATIVE MIXING AND AERATION CONTROL STRATEGY TO SAVE (A LOT OF) ENERGY IN WASTEWATER TREATMENT PLANTS

Introduction

Aeration accounts for more than 50% of operational wastewater treatment costs, so in that area, there still is a lot of optimization potential. You will be developing an innovative strategy to control the aeration and mixing based on knowledge generated through models. You will try to maximize oxygen transfer efficiency, with the least amount of energy. The full-scale wastewater treatment plant of Eindhoven (Netherlands) will be used as a case. If you succeed, it will be an important finding for the sector. The thesis is in close collaboration with UGent spinoff company AM-TEAM, and it will be directly hands-on modelling due to prior experience with the models and the plant. Modelling will be combined with some on-site data collection.

Methodology

You will use the existing CFD (computational fluid dynamics) models to 'play' with propeller speeds and aeration flow rates. During the last 4 years, a solid basis of models for the Eindhoven plant was developed at BIOMATH. By varying flow rates of water and air, you will acquire insights in how the bubbles mix with the water. Most likely also full-scale measurements will be performed on site.

Figure 1 – The Eindhoven WWTP, with an overlay of CFD simulation of air distribution

Objectives of the thesis

Based on the data simulated by the 3D model, you will develop empirical correlations that can be used to optimally control the mixing and the aeration to enhance oxygen transfer. This means, looking for ways to change air flow rates in different aerators separately, and vary propeller speeds (for mixing).

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BACKGROUND

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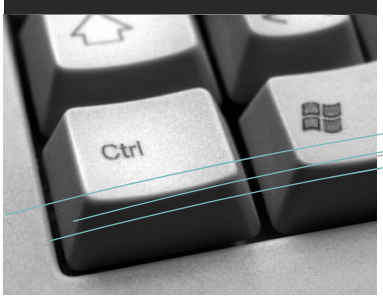

Waterschap De Dommel

AM TEAM Advanced Modelling for process optimisation

BIOMATH