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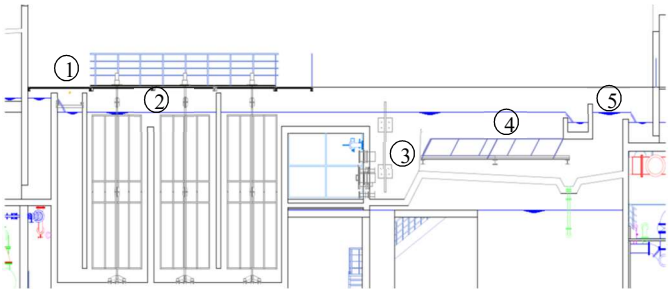
Context: Postdoctoral Research
(07.05.2017 – 31.05.2018)

NUMERICAL STUDIES ON DISSOLVED AIR FLOTATION (DAF) SYSTEMS

Objectives

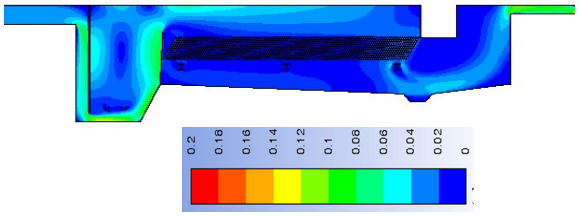
- To understand the flotation system in terms of operation and design.
- To improve effluent turbidities and thereby increase the plants' treatment capacity.



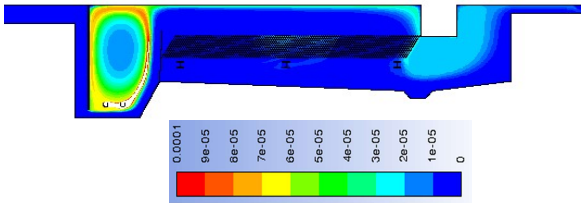
Cross section of the flotation plant with (1) coagulation unit, (2) flocculators (3) contact zone, (4) separation zone, (5) overflow weir for effluent withdrawal.

Background

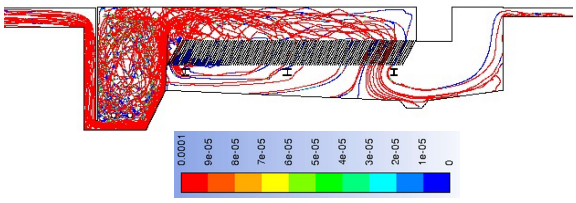
Dissolved Air Flotation (DAF) has received more attention recently as separation technique in both drinking water production as well as wastewater treatment. However, the process as well as the preceding flocculation step is complex and not completely understood. Therefore, given, the multiphase nature of the process (liquid, solids and gas) research in the field of DAF requires fluid dynamics studies in order to understand and optimize the system in terms of operation and design. The present study simulates the flow patterns inside a large DAF tank (WPC Kluizen, Belgium), employing computational fluid dynamics (CFD).



Mixture velocity (m/s)



Contours of air volume fraction



Contours of floc (DPM) concentration

Methodology

- Euler-Langrangian approach for multiphase flow
- Flocs will be treated as the discrete phase