

# The Use of CFD to Simulate Turbulent Flows in Laboratory and Full Scale Flocculation Processes

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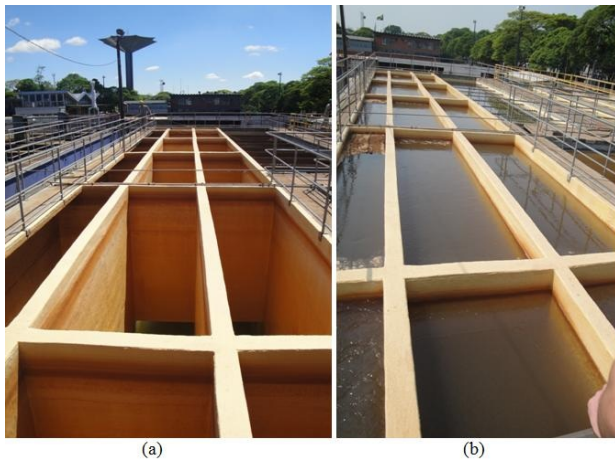
## Abstract

The hydraulic flocculates are employed in water treatment plants (WTPs), but may present problems during the mixing stage reducing the efficiency of treatment. In this context modeling of a hydraulic flocculate using COMSOL and a 1:10 scale model of the Maringá-PR Brazil city WTP flocculate was done. The WTP flocculate is shown in figure 1 and the model illustrating the acrylic flocculate chambers in figure 2. A solution of NaCl (15g/L) was added in the inflow flocculate (model) and samples were collected at chambers 6, 15 and 28. The change in salt concentration was determined using an Atomic Absorption Spectrometer (AAS) and the results are shown in figure 3. The mesh adopted for flocculate and the streamline are in figure 4. New simulations will be conducted by adding the transport model in COMSOL to determine the residence time distribution and compare the results obtained for model (1:10). These results may support geometric changes in the WTP flocculate which will result in the reduction of chemical dosage, energy and sludge production.

## Reference

1. Bridgeman.J, Jefferson.B, Parsons.S.A, The Development and Application of CDF Model for Water Treatment Flocculators(2010) 99 - 109. Advances in Engineering Software.
2. Residence Time in a Turbulent Reactor - Residence Time in a Turbulent Reactor SOLVED WITH COMSOL MULTIPHYSICS 3.5a - Model Gallery.

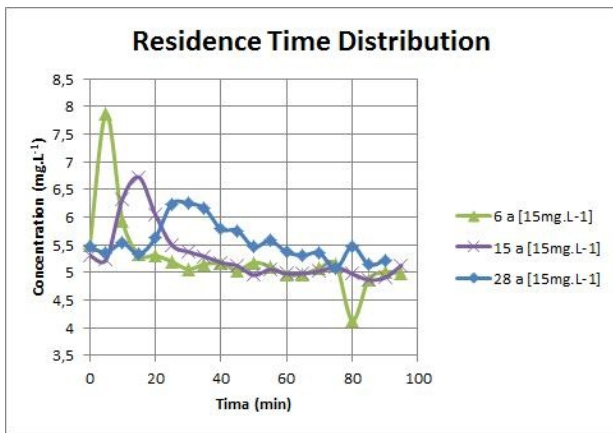
## Figures used in the abstract



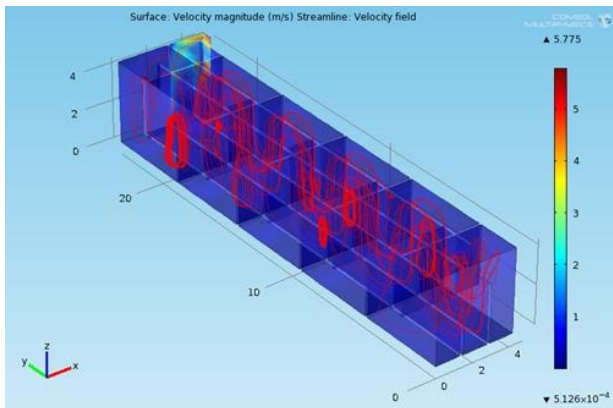
**Figure 1:** WTP Flocculator (a) Empty (b) Full.



**Figure 2:** Model of WTP in acrylic.



**Figure 3:** Residence Time Distribution in tank 6, 15, and 28.



**Figure 4:** Streamlines results of velocity magnitude.