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Yiwen Ng's Individual Contribution Page

Spring 2012 Mid-Semester Contributions

As part of the Sedimentation Tank Hydraulics Team, I developed a simple mass balance model to describe the flow of flocs in the floc blanket and floc hopper. I explored two different methods of wasting sludge from the floc hopper, continuous wasting and pulsed wasting, and concluded that the continuous wasting of sludge from the hopper is the most ideal, because it minimizes operator maintenance and clean water waste.

My team also conducted a variety of experiments to further our understanding about floc blanket formation and maintenance:

- Marcala Simulation experiment: My team simulated the retrofitted Marcala sed tank with our lab apparatus with a 100 NTU influent and confirmed that the new geometry could resuspend flocs efficiently and form a stable floc blanket.
- Low influent turbidity experiment: We were unable to form a floc blanket over a period of 2 days when the influent turbidity was set to 5 NTU.
- Seeding experiment: We found that directly pumping sludge into the tank was not a very effective way to form a stable floc blanket because the sludge particles were too small and had low settling velocities. Nevertheless, this experiment showed promise that floc recycle would be successful at forming a floc blanket quickly in the tank, even when influent turbidity is low.
- Floc hopper experiments: Our preliminary floc hopper experiments were not conclusive, but they indicated that important factors that need to test include the effect of alum dose on the stickiness of sludge and the ease of draining sludge, and the effect of floc hopper geometry on the rate of sludge consolidation.

Summer 2011 Contributions

As part of the Sedimentation Tank Hydraulics Team, I improved upon the existing geometry of the sedimentation tank bottom to promote floc blanket formation in the tank. Experiments with different bottom geometries revealed that the existing flat bottom geometry did not allow for adequate resuspension of settling flocs by the incoming jet. Based on visual observations, the best bottom geometry was determined to be a semicircular trench with a 10 cm diameter. This new geometry contributed to the design of modified diffusers and a jet reverser, which were retrofitted in one of the AguaClara plants in Honduras in January 2012.

Spring 2011 Contributions

As part of the Sedimentation Tank Hydraulics Team, I determined that the minimum angle of repose required for floc blanket formation to be about 25 degrees. The minimum angle of repose is the minimum angle of the sloping sides of the sedimentation tank that allow settling flocs to be returned to the jet. Angles smaller than the angle of repose resulted in sludge accumulation, while angles larger than the angle of repose would result in a taller and more expensive sedimentation tank, but also quicker floc return to the jet.