PSS Bibliograhpy

Annotated Bibliography

1. B. Zajdela, A. Hribernik & M. Hribersek. "Experimental investigations of sedimentation of flocs in suspensions of biological water treatment plants." Computational Methods in Multiphase Flow IV (2007).

"Deals with the movement of flocs in suspensions, as they appear in biological water treatment (BWT) plants."

2. Casey, J. J., K. O'Donnel, and P.J. Purcell. "Uprating sludge blanket clarifiers using inclined plates." Aqua, 2, 1984:91

This article states that "Large (2.9 m) plates, however, have been shown to be preferable to shorter (1.5 m) plates," even though we have successfully shortened the plates in some of the plants built in Honduras by decreasing the spacing between them.

3. Letterman, Raymond D. Water quality and treatment a handbook of community water supplies. New York: McGraw-Hill, 1999.

This article states that for plate settlers, "an effective spacing is about 0.3 m, but no optimization studies are known to have been published." It also claims that plate settlers make no difference, or disrupt the system, which is contrary to what we have seen in the lab.

4. Sarkar, Sudipto, Dibyendu Kamilya, and B.C. Mal. "Effect of geometric and process variables on the." Water Research 41 (2007): 993-1000.

5. "Tube Settler Systems for Clarification." Welcome to Brentwood Industries. 15 Apr. 2009 <http://www.brentwood-ind.com/water/tubesystems_main.html>

Brentwood Industries explains why the effluent quality is greatly improved out of sedimentation tanks when tube settlers are present.

6. Fong Leung & Probstein, "Lamella and Tube Settlers: Model and Operation", Ind. Eng. Chem. Process Des. Dev., 1983, 22 (1), pp 58-67.

This article explains performance in terms of a two-layer (clarified and sludge) model. Model is generalized and dimensionless and requires knowing the densities of the two layers. Recommends a spacing of 4 cm for lamella and a 2.5 cm diameter for tube settlers, but does not explain the rationale for these values.

7. Okoth, Centikaya, and Briiggemann, "On hydrodynamic optimisation of multi-channel counter-flow lamella settlers and separation efficiency of cohesive particles", Chemical Engineering and Processing, 2008, 47 (1) : 90-100.

This article claims to use a superior model that focuses on the hydraulics of the system (as opposed to describing performance in terms of mass flux); their approach may be useful for our purposes but will have to be modified to apply to cocurrent lamella. Also they apply this model to wastewater treatment, not river water treatment.

8. J. Ziolo, "Influence of the system geometry on the sedimentation effectiveness of lamella settlers", Chem. Eng. Sci. 51 (1) (1996) 149-153.

This article describes the system in terms of "sedimentation effectiveness" which mostly depends on the relative length (L/h for lamella and L/D for tube settlers). Analyzing AguaClara clarifiers in terms of this model could yield valuable spacing guidelines.

9. Chen, Y. R. (1979). Design criteria for inclined tube settlers. AIT master's thesis, Asian Institute of Technology, Bangkok.

This article is frequently referenced in literature that is of interest to us. However, since it is a Master's Thesis from an Asian university, it has been difficult to acquire. This article would be a good bet for finding spacing guidelines and possibly some analysis in terms of the velocity gradients that solid particles encounter in the clarifier (could provide comparisons for our floc rollup findings).

10. Steady-state humic-acid-containing blanket in upflow suspended bed

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Link: http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6V73-4FD9SX6-3-W&_cdi=5831&_user=492137&_pii=S0043135404005780&_origin=search&_coverDate=03%2F01%2F2005&_sk=999609994&view=c&wchp=dGLzVtb-zSkzV&md5=675f780625123dc2025924fb0e401033&ie=/sdarticle.pdf
Summary: The article assesses the performance of floc blankets with different NOM and clay suspensions over a range of upflow velocities. The coagulant used was PACl. Clay was used as a turbidity source - 40 NTU and 450 NTU. It was found that the optimal dose of NOM was around 1 mg/L

11. Floc Strength Evaluation at Alternative Shearing with Presence of Natural Organic Matters

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Link: http://www.informaworld.com/smpp/ftinterface~content=a794890674~fulltext=713240928~frm=content
Summary: This article focuses on the effects of NOM on fractal dimensions of flocs subject to different shearing. The study used synthetic raw water prepared with a "prescribed quantity of UK ball clay powder and solution with 0.1 g L-1 $NaHCO_3$ and 1.23 g L-1 $NaClO_4$ to yield solid content of 0.125 g L-1, yielding turbidity of 100 NTU, suspension alkalinity of 100 mg L-1 equivalent, and pH of 7.0." Starch, Chitosan, and humic acid were added to the solution, sheared, and the results compared. It was found that flocs with humic acid were more susceptible to shear and generally produce smaller flocs.