Eawag
Überlandstrasse 133
8600 Dübendorf
Switzerland
Phone +41 (0)58 765 53 61
Fax +41 (0)58 765 53 75
info@eawag.ch
www.eawag.ch

Eawag Seminar Invitation

Creating the next generation of Flocculation/Floc blanket/ Sedimentation/Filtration technologies

Speaker ***Dr. Monroe Weber-Shirk,***
Cornell University, Hollister, USA

When **March 31, 11.00 – 12.00 a.m.**

Where **Forum Chriesbach C20, Eawag Dübendorf**

Abstract Particulate and dissolved contaminant removal from source waters are core technologies for healthy societies. Despite the critical role of these technologies it has not been possible to predict their performance or optimally design these processes based on first principles. We are researching the physics of these processes and those discoveries are incorporated into new municipal water treatment plants.

Flocculation is controlled by the fractional coverage of particles by coagulant precipitate. Floc collisions in a shear flow have low probability of attachment when the relative velocity of their surfaces is high. This leads to the insight that the conversion of small particles into large flocs slows down as the concentration of actively growing small flocs decreases. The role of tapered flocculation is to increase the concentration of actively growing flocs by reducing the relative velocities during collisions.

Floc blankets are fluidized beds of inactive flocs that produce very low fluid shear. Small particles and flocs collide with each other due to this shear and the collisions are successful because the relative velocities are low.

Sedimentation tanks perform poorly when sludge accumulates, biodegrades, and produces gas bubbles that carry particles to the surface. The next generation of sedimentation tanks have no sludge accumulation and are cleaned without any moving parts.

Particle removal by conventional and stacked rapid sand filters appears to be dominated by interception at flow constrictions that continue to collect particles and constrict until the relative velocity between particles and the constriction exceeds the maximum attachment velocity. These flow restrictions result in pressure drag and explain the rapid increase in head loss even when filter pores have a very low particle volume fraction.

These evolving physical models of water treatment processes reveal opportunities for design improvements and new applications.