



CIVIL & ENVIRONMENTAL ENGINEERING SEMINAR SERIES

William Pennock New Jersey Institute of Technology



Oscillating Flows in a Fluidized Bed Clarifier

In drinking water treatment, fluidized bed clarifiers (FBCs) are a water treatment process that combines lamellar sedimentation with further opportunities for flocculation in a fluidized bed at the bottom of the upflow reactor. In previous work, David Katoshevski and Asher Brenner have demonstrated that adding carefully chosen oscillations to a flow can enhance flocculation by causing hydrodynamic grouping. Our project is intended to determine whether this same phenomenon can be applied to the FBCs of the type William Pennock worked with in India (with AguaClara Reach) to see if further performance improvements can be made by simple adjustments to the design and operation of FBCs. The Pennock Lab is building a pilot to test this experimentally, and the Katoshevski and Brenner Labs are conducting computational fluid dynamics studies to study the fluid mechanics of the reactor and predict results from incorporating flow oscillations. We will present prior work informing the current study and present current and future work by our groups on this subject.

William comes to NJIT from Cornell University, where he completed his Ph.D. in Environmental Engineering. He was awarded a National Science Foundation Graduate Research Fellowship for his work on improving physical and chemical mechanisms to make water treatment more efficient and resilient by avoiding the use of electricity and moving parts. During his graduate studies, William worked primarily on a design algorithm and a performance prediction equation to aid the engineering community in the design and operation of hydraulic flocculators, which prepare suspended contaminants and pathogens for removal through later processes like filtration and disinfection. The chief aim of his work is to expand access to municipal drinking water treatment throughout the majority world. Before joining the department, William was working in India on a Fulbright-Nehru fellowship toward the development, dissemination and adoption of a new village-scale drinking water treatment plant he and his colleagues from Cornell and India designed. Dr. Pennock earned his B.S. in Civil Engineering with a minor in Environmental Engineering right here at NJIT, and was an active member of the university's chapter of Engineers Without Borders.