Demo Plant Research

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Past Research

The first few demo plants were built by Sara in Summer 2007. The design has since been improved and modified. The paper on the demo plant is available on the original CEE AguaClara website. In a nutshell, the demo plant is a transparent plastic miniature AguaClara water treatment plant. While the dimensions are not to scale with a real plant, the principles behind their operations are the same. The demo plant is gravity powered and fed by float valve-equipped flow control modules. The flocculator is vertical flow and sedimentation is done in an upflow lamella sedimentation tank.

In Fall 2007, the team investigated the effect of introducing obstacles into the flow. Currently, the only sources of shear (and thus mixing and flocculation) are the 180° bends between the vertical flow channels. The flocculator is not as space-time efficient as it can be. By introducing suitable obstacles (that create shear and mixing) into the vertical channels, the average shear is increased significantly without increasing the maximum shear. The results of the experiments were mixed and inconclusive. While theoretically, the obstacles should improve the performance of the plant, the actual results did not show those trends. Many parameters, some of which are still unidentified, affect the performance of the plant.

In Spring 2008, the team went "back to basics" to redesign the demo plant, and to characterize the performance of the demo plant without introducing obstacles. Aside from the plant to be built for demonstration only, the team also built a plant for experimentation. It is hoped that the results of the performance tests will shed some light on the limitations of the plant and thus help explain the results of the experiments done last semester.

Spring 2008 Experiments

- **Determining Flocculation Efficiency**
  In order to redesign the Demo Plant, the team needed to determine the flocculation efficiency factor, which accounts for the fact that not every collision between particles sticks.

- **Performance Tests**
  Experiments were performed on the new plant to characterize its performance. The detailed description and results of the experiments can be found in this section.

Fall 2007 Experiments

- **Introducing Obstacles**
  The Demo Plant team experimented with introducing obstacles into the flocculator. The detailed descriptions and results of these experiments can be found in this Fall 2007 report.

General Demo Plant Instructions

- **Process Controller Instructions**
  Instructions on how to set up the process controller program for lab set up of the demo plant