Flume Turbulence

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Team Zeta played with the flume for the second group project. With the use of the flume we were able to observe laminar and turbulent flows. One of the original ideas was to create a wave that is cresting, which proved hard to capture. The timing, lighting, shutter speed is something that needs to be worked out. We created solid boundaries with the different plexiglas shapes provided to study the interactions of the flow with the obstruction.

The apparatus was the flume, which is a 2.5m x 76mm x 250mm rectangular channel. For our particular flow we created a boundary about 6 inches high that causes the flow to spill over, and run to the end of the flume where it drains. The pump creates the recirculation flow.

The flow visualization technique used was food coloring, and simply the reflection of the water. In one image red dye was used, and in another, both red and green dyes were used. The lighting was the 500-watt light and the florescent light of the ITL lab. We placed a white background behind the image, and back lighted the apparatus through the white background. The lighting proved to be difficult for we had to be careful not to create a reflection. The first shot was from the side, and the second was at an angel from below. The food dyes highlighted the turbulent motion as they passed over the boundary.

The field of view was about 6 inches by 6 inches. The camera was within a foot of the flume. The camera is a Sony Cyber Shot dsc-h5 7.2 mega pixel digital camera. It shoots 3072 pixels by 2304 pixels which amounts to 7077888 pixels. The

camera does not have a RAW function, with the FINE setting being the highest and the one that I used. I shot the image at 100 ISO, F7.1 and shutter at 1/400. The camera has a built-in macro function that I used. The light simply was not enough, so I did some serious altercations in Photoshop. Shooting through the Plexiglas also caused some interference. The Plexiglas casing also made the lighting difficult because the flash could not be used for if would create a reflection. I adjusted multiple points on the curves, intensified mid-tones, amped up the saturation, color, lightened it, applied more contrast, hacked out and erased the background, and simply painted in the boundary for its textures and transparences were distracting. The original image was pretty decent, but I wanted something that only described the flow, without distractions. One of the images is more 2dimensional which was shot from the side, and the other had two colors, and the angle the photo was taken shows the 3 dimenionality.

The images reveals the how turbulent a laminar flow can become. I enjoy the images, and had a real fun time on Photoshop with these images. They are so abstract, but yet real, physics. I enjoy the three-dimensionality one of the right image and the turbulent vortices and the final laminar push over the boundary. The images could definitely be done better with a clean apparatus, cleaner lighting. After all, if was in a lab, so getting correct lighting is something difficult. I would like to be able to shoot a higher shutter speed. I did really enjoy the Photoshop elements if this project. For pictures that I take I feel that Photoshop really takes away from my images if used too much, but these images are so abstract.