

Lael Siler

Flow Visualization 4200

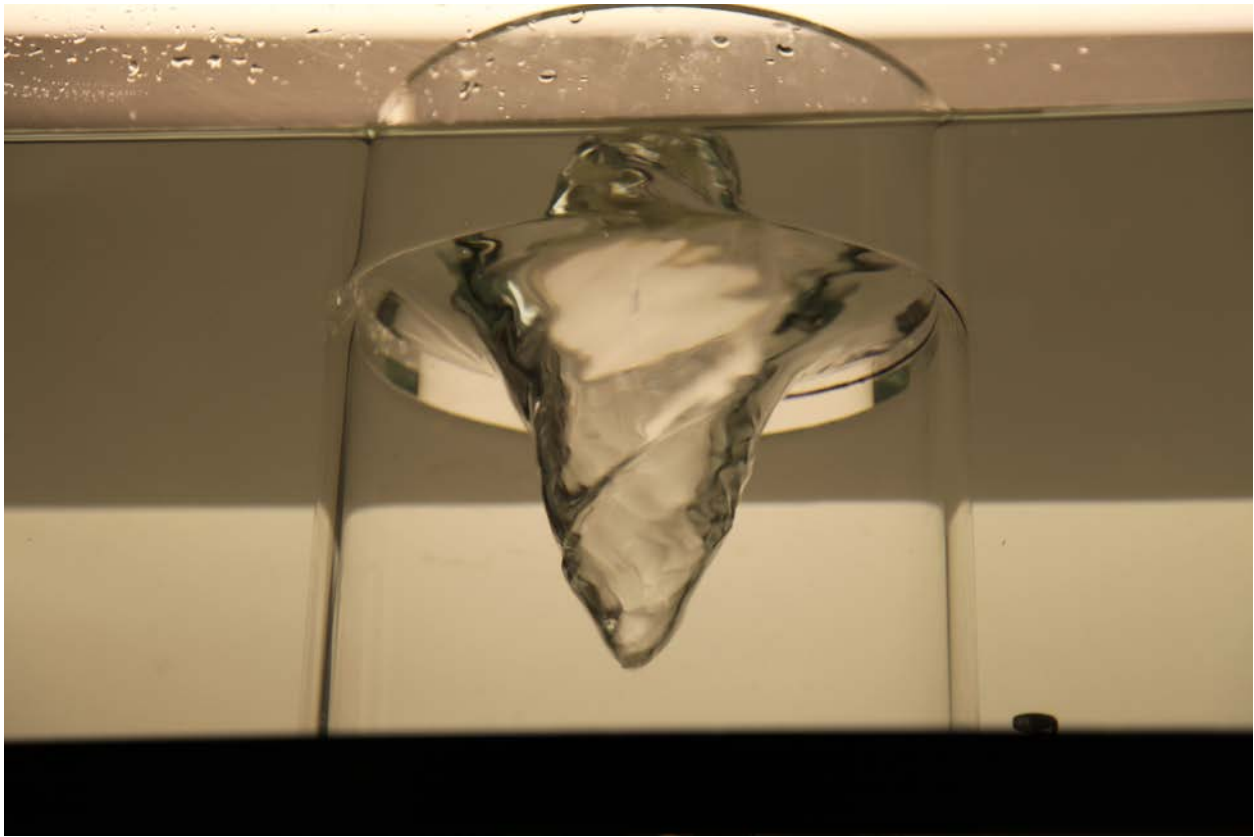
Water Vortex



This image was from William Derryberry, Kristopher Tierney, Mark Voll and I's second team project. We decided to try creating and capturing a water vortex. After experimenting with different water levels, lighting set ups, and food dye, we each focused on our own variation of the vortex.



For our set up, we used a 2' tank filled with water and a 7" plastic cylinder. We raised the tank with 6" containers and placed a magnetic plate underneath the tank. Since the plate was pressed against the bottom of the tank, a magnet placed on the bottom of the cylinder would react with it. When we turned the plate on, we would slowly increase the strength of the oscillating magnetic force and the magnet in the tank would begin to spin and accelerate in place. When the magnet spun fast enough, a vortex would begin to form from a small indentation in the surface of the water and eventually become a full "twister" which came close to touching the magnet. If the magnet was spinning too fast, the vortex would contact it and the air bubble pushed the magnet out of place and it would lose attraction to the plate. After a couple trials, we were able to find the sweet spot for speed and the vortex would spin wildly, always changing surface shapes but maintaining a cone formation.



For visualizing the water vortex, we decided to put a white poster behind the tank which covered some wires and other distracting elements. There was a fluorescent light above the tank attached to a cabinet. This provided ample light to the tank so we didn't use any additional lighting. It was difficult to capture the water vortex directly facing it because the glass tank would reflect my camera, even without a light source facing the tank. Because of this, I squatted down and captured the vortex from below. There I noticed a wonderful reflection of the vortex from the surface of the water and decided to use that as my final shot. I was hoping there would be a way to hide the dark waterline from the surface but it was not possible if I wanted to capture the reflection too.

This photo was taken on a Canon 5d Mark ii with a 24-105mm telephoto lens. I was about 2 feet away from the tank zoomed in all the way at 105mm. I set the aperture to f/4 with an ISO 100 and shutter speed of 125 at all times. Most shots had too much motion blur to use because of the slower shutter speed but I had to use the largest aperture

possible to let in the limited amount of light we were using to avoid reflections. This shot does contain some motion blur but I think it really help viewers imagine the movement of the vortex. I was very impressed by the amount of detail captured in this shot.

When I was editing this photo, my first step was cropping out the tank and only showing the cylinder that the vortex was contained in. Since the fluorescent light made the image very warm, I used greyscale which also emphasized the streamlines of the vortex. Something about the angle of the shot was irritating me when I made these changes so I decided to flip the image vertically. I was very happy with the result. Now the vortex looked like it was jetting out of the water, the angle was much more interesting to look at, and the reflection looked like a reflection; rather than another vortex forming above the actual one.

I had a great time working with the group for this project, the water vortex was fascinating to watch! I was impressed by the food color dropping into the vortex but was mostly interested in the movement of the water. I think water vortexes are mesmerizing to watch, even when flushing a toilet! I find my mind gets absorbed by the flow and it pulls thoughts and feeling in and out of me. In the future, I would like to create a water vortex on a much larger scale or try finding naturally occurring ones in the ocean or side of a river.