

Charles Keely  
Team Third  
Reflections of an LED off of a bubble  
Team: Michael Karns, Jeremy Aparicio, Max Rodgers

Our team had planned on shooting soap films because of the vibrant colors that were produced in them. However, it was a busy time of year for all of us and the only time everyone else could meet was during a time I had class. Because of this, I showed up after the sun had gone down and there was not enough natural light to shoot. Max Rodgers began to make soap films with the apparatus inside to show me what it looked like, and I noticed that when the bubble was created, some interesting reflections were occurring off of the surface of the film from an LED strip that was hanging on the ceiling above.

For my shot, the lighting was a result of the LED strip, and the individual lines that you can see are there because each LED light can be thought of as a point source of light. The film was a simple mixture of soap and sugar. Unfortunately the quantities were not measured out by my teammates during its creation. In order to capture a film, we used a hangar that was bent into a rectangle, dipped it into the solution, and pulled it out. As it was pulled out, a bubble would form around the perimeter of the wire that would stay connected to the original solution such that it would form a hollow sphere. When the wire was pulled far enough away, what seemed to occur was it would break from the original solution and envelop just the area of the wire. This would cause the bubble to bounce up and down, which caused the reflections from the LED to flicker in interesting ways.

I used a DSLR to capture the image. The shutter speed was manually controlled and I closed the shutter after about a second on average. This was just enough time for trails to form from the point source reflections off of the bubble, but any more time would render the image too hectic and blurry. I used a Nikkor 35 mm lens at an aperture of 1.8. The ISO was set to change automatically so it varied, but at numbers less than 1,000. The shots were all taken at around two feet away from the surface of the film. After taking the photos, I used gimp to create a collage between three of them. A color gradient was chosen to work with the aesthetic of the first three blue and black photos. The original three photo collage was then manipulated to be black and white with gimp as well.

I was really excited to capture these photos because one of my favorite visual aesthetics in flow visualization is the laminar flow, particularly when multiple jets create the flow. Although this picture was not a laminar flow, the way that the point sources of the LED's traced makes the image appear like a bunch of different laminar flow patterns. I would have liked to have been more of a part of the initial soap film colors that were captured, but I think that I had some serious luck capturing these unique photos. I would like to experiment in the future more with LED strips and long exposure photography.