# Team Third Report

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MCEN 4151

After seeing a bunch of Marangoni images in class, I was inspired to create one of my own. After playing around a bunch with assorted color dyes, I realized that it would be interesting to color the base fluid, rather than having it be white.

For the final image, I created a yellow base fluid by pouring milk into the saucer and adding a few drops of yellow food coloring. Then, I squirted blue, green, and red food coloring dyes on top of the yellow base. After letting it sit for a few seconds, the colors started to vibrantly mix and create vortexes. It is important to note that this was done on a small white plate in a brightly lit room. No other lighting was used.

Figure 1. Image posted to flowvis website for team third assignment

The physics behind this image is quite interesting.  Propylene gycol is one of the ingredients in food coloring. This chemical is a surfactant, which means it reduces the surface tension of a liquid in which it is dissolved. This gradient of surface tension causes mass (food dye and milk) to be transferred differently throughout the fluid. This mixing due to surface tension effects is called the Marangoni effect. The mixing is clearly shown in the above image through the colors as well as the vortex rings.

Yellow dye and 2% Organic milk was used to create the yellow base fluid. Red, blue and green dyes (Kroger brand) were used to create the vortexes in that fluid. No flash setting was used, and the experiment was imaged inside using indoor lighting as the only source of lighting.

During post processing, I increased the contrast to bring out the colors a bit more. I also cropped the image slightly to enhance the symmetry of the image.

Image Specifications are as follows:

- Size of field of view: 5 inches
- Distance from object to lens: 4 inches
- Lens focal length and other lens specs: 1.5 ft.
- Type of camera: Digital
- Photoshop: cropping and adjusting contrast

This image reveals how fluids act when there is a surfactant present in the mixture. I really like how the colors and textures turned out. In the future, it would be interesting to try different colors or do a color inversion in post processing.