

Jayson DeBellis
Flow Viz. – spring 2009
Visualization Report #4
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This was the project I was most looking forward to during the semester, which was the interaction between different proportions of corn syrup and water based food coloring. I hoped to see fairly quick diffusion of the dye into the syrup, however I had to keep diluting the corn syrup until its viscosity was such that the food coloring could actually break the surface tension and begin interacting. I took several forty-five minute videos with the setup left to its own devices (one drop each of red, yellow, green, and blue dye arranged in a line on top of the syrup), and was only able to see significant mixing of the two liquids over time after I diluted the corn syrup with two parts water.

The flow apparatus was very simple. I used a large restaurant style sheet pan with a piece of parchment paper laid on top of it. I then covered the whole thing with plastic wrap, which helped keep the rig clean and allowed me to reset the whole thing fairly quick. The basic flow occurring was diffusion of a low-viscosity liquid into a very high one. I had five different mixtures; the base is corn syrup diluted with two parts water, and then I made four different proportions of corn syrup and water. The proportion of water for each color was about 90% for yellow, 80% for red, 70% for green, and 60% for blue. The entire flow was contained within a square foot space. The final image was produced by allowing the fluids to mix for about 20 minutes, then inclining the pan about thirty degrees (higher viscosity liquids flowing down into the lower ones) for ten seconds and allowing it to rest again.

The only visualization technique used here was dye, with the different colors representing the different proportions of cornstarch to water. The food dye was water based, as opposed to alcohol, and I used approximately one drop for every cup of liquid being dyed. I lit the entire apparatus with two 150-watt photoflood lights, which created a problem due to glare off of the plastic wrap. I got around this by cropping out the highly reflective portion of the image.

This image was removed from the timeline of a video clip taken with a MinoHD camcorder at full (720-interlaced) quality using final cut pro. The camera was mounted onto a tripod and then positioned horizontally pointing at the ground. I streamed the video directly onto my computer to allowing recording time over sixty minutes (the cameras built-in limit). The aperture and ISO are fixed at f/2.4 and 200 respectively. The focal area of the lens is fixed at 1.5m to infinity and the camera records at 29.98 fps (NTSC standard).

This image didn't reveal what I expected it to, and I had to manipulate the apparatus much more than I had originally hoped to in order to get an image I felt was worth submitting. The overall setup and execution of the project took about six hours, which was also about twice as long as I expected it to take. My main problem was underestimating the viscosity of raw corn syrup and assuming the dyed liquids would freely mix with it.