

Report #1 – Get Wet Assignment Fall 2018

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MCEN 4151-001: Flow Visualization

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ABSTRACT

In this report, the assignment introduces creative artistry, simple flow visualization, and basic camera work. This initial assignment within MCEN 4151-001: Flow Visualization helped students familiarize themselves with their available photographic equipment, their base knowledge of flow phenomena, and expose themselves to valuable critique from their fellow colleagues. The image attached to this report was intended to explore the phenomena of fluid viscosity, in particular, syrup, and its higher viscosity compared to water. Viscosity defines as a fluid property that resists deformation between its layers of flow due to shear and tensile stresses. In general terms, it is commonly described as the “thickness” of a fluid, and the image taken in figure 1 shows the thickness of syrup is much greater than the thickness of water.



Figure 1: Mrs. Buttersworth Syrup poured into a glass of water. Raw image edited with black and white textures.

FLOW APPARATUS

The flow apparatus used in figure 1 was a curved glass of water that contributed to the motion of the flow. The syrup exited out of the standard cylindrical channel of 1.00cm diameter, and entered the entrance of the curved glass, measuring 7.62cm in diameter, with the widest portion at 8.89cm in diameter, and the base of the glass at 2.5cm in diameter.

VISUALIZATION TECHNIQUE

Materials used in this image are as follows:

- Mrs. Butter-worth's Original Syrup 24 Fl OZ bottle
- Libbey Stemless Wine Glass
- Two pieces of white printer paper
- iPhone 6s Plus

The environment of the image was taken under bright bathroom lighting, under three lights, placed on the left side of the sink against the window. The two pieces of paper were placed behind and the bottom of the wine glass for a clean background, centering the focus onto the syrup within the water. The camera was exactly 3 inches from the glass, propped straight by two lotion bottles and the counter of the bathroom. The image was taken from a recorded video as the syrup was poured into the wine glass. The best images of the syrup swirling around the wine glasses were screenshotted from the iPhone and the image in figure 1 was selected for editing.

PHOTOGRAPHIC TECHNIQUE

With limited photographic equipment, an iPhone 6s Plus was used to take the video, in order to get the perfect picture.



Figure 2: Shows the raw, unedited image from the recorded video.

The following photographic settings were used:

- Size of field of view: 4.15mm
- Distance from object to lens: 3 inches or 76mm
- Lens focal length: 35mm
- Exposure specs: F/2.2 Aperture, 1/500 Shutter speed, ISO 400
- Photo Editor used from my HP Envy Laptop on Windows 10

CONCLUSION

This image, figure 1, reveals the complex motions of viscosity and the multiple layers of surface tensions acting upon syrup and water. Turbulent flow is seen as wisps of syrup ripple against the curved glass. I would personally love to improve upon my photography skills and photography equipment, as well as have a deeper understanding behind the physical calculations behind the motion created by the viscous flow and the geometry of the curved wine glass.