

Get Wet Project Report

The purpose of this image is to create a good image that demonstrates the fluid flow phenomena being observed for the initial 'Get Wet' assignment. My initial intent was to display the flow of alcohol at 0 degC when dropped into water at room temperature. Unfortunately, when I attempted this, the visualization was very difficult to see, and I realized the dispersion of food coloring dye into the cold alcohol was much more interesting. Therefore the intent of this image is to be a beautiful image while demonstrating the dispersion of dye in cold alcohol.

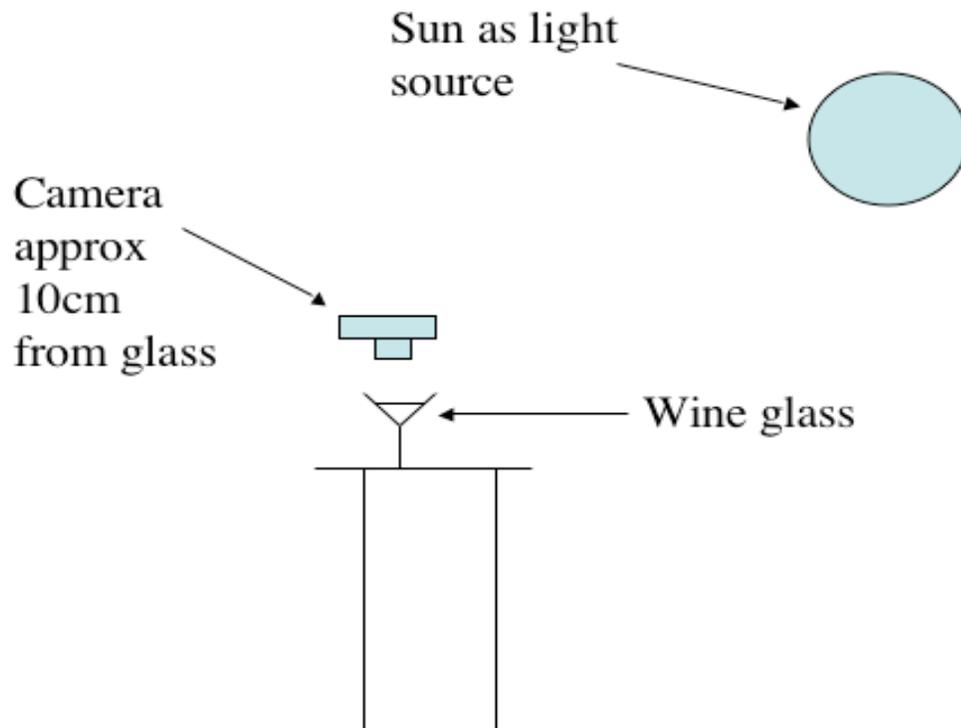


Figure 1: Sketch of setup for flow visualization experiment.

The setup that was used to create this image is simply a wineglass on a stool with the afternoon sun as the light source (Figure 1). The cold alcohol, which is McCormick's brand vodka put in a freezer, was placed in the wine glass and then the dye was added in several drops. The images were then taken with the camera roughly 10 cm away from the surface of the fluid. The basic flow was simply the free flow of the dye as it dispersed into the alcohol. Using linear interpolation I found that ethyl alcohol has a viscosity of about 1.89 centistokes and a density of about .808 g/cc at 0 degC (Ref 1). Assuming the dye is mostly water, it has a viscosity of 1.002 centistokes and a density of .998 g/cc at a room temperature of 20 degC (Ref 1).

The visualization technique used in this case was undiluted food coloring dye. The dye created pathlines that illustrated its path as it dispersed in the alcohol. The lighting used was direct afternoon sunlight coming through a sliding glass door.

The camera used to take this picture was a Canon S30 3.2 mega pixel digital camera. The image was taken with the lens roughly 10cm away from the surface of the fluid with a lens focal length of 7.1 mm. The ISO was 50 and the shutter speed was 1/40 seconds. The aperture was set at 2.8 allowing for a fairly shallow depth of field to eliminate unwanted background items. The final image has been cropped somewhat from the original image.

This image reveals the behavior of a fluid when it is dispersing in a fluid with a higher viscosity and a lower density. It also demonstrates the idea of pathlines. I like the strong blue colors in the image and the detail shown. I also like that the glass is somewhat cropped as I feel that is more pleasing to the eye. However, there are some reflections that in the future I would try and avoid as I find them distracting from the rest

of the image. I would also like to find a way to keep the side of the glass from freezing as that prevented me from taking any good images from the side of the glass. It could be interesting to try this again and hold the viscosity of the fluids constant and see what effect just a difference in temperature would have. In the end, I believe I have fulfilled my intent with this image by creating an image which demonstrates the flow phenomena and is also a pleasing image.

References

1. http://www.engineersedge.com/fluid_flow/fluid_data.htm