Team Second Image Write Up
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The purpose of this image was to take a picture for the second team assignment. As a team we decided to work with beverages and the foam or bubbles associated with them. My intent of the image was to capture the foam at the top of the glass initially start to spill over on one side. I was trying to see how on one side of the glass the foam was able to support itself, but on the other side the foam gave into gravity and started to spill over. I was assisted by Jeremy Aparicio who poured the beer into the glass while I took the photos.

The setup for this image was relatively simple. Figure 1 shows a schematic of the set up.

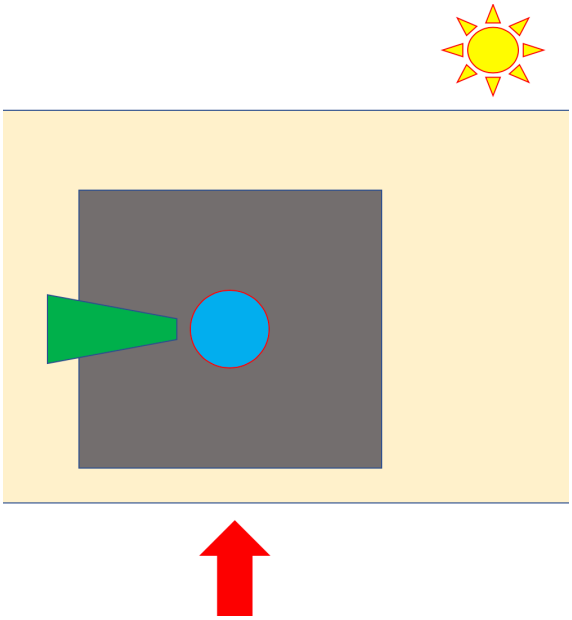

Figure 1: Schematic of the set up used for the image.

The tan rectangle is the table where everything was rested on. This table was located outside in my front yard with full sun exposure. The grey square represents the grey backdrop that the glass was rested on and behind the glass to give a solid background. The blue circle represents the glass, and the green trapezoid is the bottle of beer that was poured into the glass from above. The camera was slightly above the top of the glass looking down represented as a red arrow. The light source was the sun and was located just to the right of the glass shown by the sun symbol.

The basic flow is an advancing contact line between the foam and the brim of the glass. Over time as the foam spills over, more foam starts to spill over an increasing portion of the brim. The flow of the foam initially starts due to gravity being stronger than surface tension. Once a small part of the foam starts to spill it leads to a domino effect causing the neighboring particles to also slip. This will continue until the velocity of the foam traveling down the side of the glass starts to decrease because of the no slip condition. [1] This is not a turbulent flow, so I only needed three decades of spatial resolution, which was achieved. There is no motion blur therefore the image is time resolved.

We did not use any dies, smoke, etc. to make the flow standout more because we wanted to keep it natural and capture something that most people have experienced. We took the pictures outside so that there was as much natural light as possible. The sun was at an angle

just to the right of the glass as shown in Figure 1. The sun was at angle of around 45˚ from horizontal. The grey backdrop ensured the glass was in the shade so that there were no distracting shadows from the bottle being poured into the glass.

Given the diameter of the glass was 4 inches across, the size of the field of view was about 6 inches across and 4 inches tall. The distance from my camera lens to the object was 2 feet away. I wanted to sit farther away and zoom into the top of the glass to eliminate most of the background. The focal length of the lens was set to 49 mm. I used a digital Canon EOS Rebel T6i camera. The dimensions for the original and edited image was 6000×4000 pixels. The aperture was 14, shutter speed was 1/1000, and the ISO was 6400. Figure 2 shows the original image before post processing.

Figure 2: The original image before post processing.

For post processing I increased the brightness, saturation, contrast, and set the black point to be the grey background so the background appeared to be black.

The image does a great job of displaying an advancing contact line as more foam starts to spill over the brim. In my final image I really like the detail and sharpness. The viewer can not only see the larger bubbles, but they can also see the much smaller bubbles in the foam and in the liquid. The contrast between the dark background and the white foam turned out nicely. I do not like how the far-right side of the brim has been cut out of the frame. Including the entire right side of the brim would make it easier for the viewer to see the foam hanging over the edge. In terms of showing the advancing contact line, this image did a great job of showing this. This image makes me curious about how the larger bubbles formed: if they were formed by several small bubbles combining or by other means. Overall, I fulfilled my intent with this image, and going forward it would be interesting to try and track a group of bubbles and see how they change as they rise.

References

1. Kajiya, T., Daerr, A., Royon, L., Lequeux, F., & Limat, L. (2012, October 24). Advancing liquid contact line on visco-elastic gel substrates: Stick-slip vs. continuous motions. Retrieved from https://pubs.rsc.org/en/content/articlelanding/2013/sm/c2sm26714d/unauth#!divAbstract