

# Team Second Report

Fall 2019

## MCEN 4151-001: Flow Visualization

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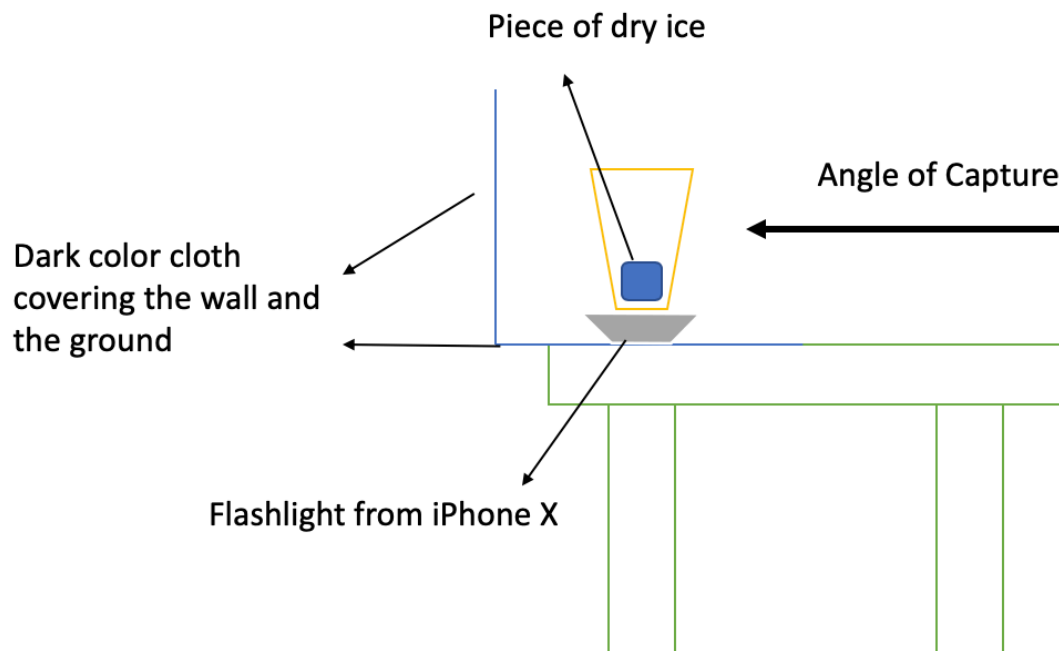
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## I. Introduction:

This report explains our second experiment as a team for the Flow Visualization course. So, for this task, we wanted to visualize and capture the interaction of water, food dye, and dry ice. To accomplish this goal, with the help of my team members, we through a piece of dry ice into a glass of dyed water, then captured the results.

## II. Experiment Set Up & Camera Settings



**Figure 1.** Side view of the experiment set up



**Figure 2.** Actual set up of the experiment

We performed the experiment in a complete dark room where the only light was coming from the flashlight of the iPhone X. Notice in Fig. 2, there is another lamp which we tried using for various set up conditions. However, the submitted photo of this experiment was without the external lamp just the flashlight at the bottom of the glass. In this experiment, we used orange food dye which colored not only the water but also the vapor rising from the interaction of the dyed water and the dry ice. The photo was taken with a Canon PowerShot SX530 HS. To capture a colorful smoke, I used 1/60 speed shutter and f/3.4 for aperture. As for the focus and ISO, I used manual macro focus with 800 ISO. Also, the distance from the glass was about 2 to 5 inches. The focal length was 4.3 mm, and the field of view is about 4x5 inches.

### III. Flow Physics

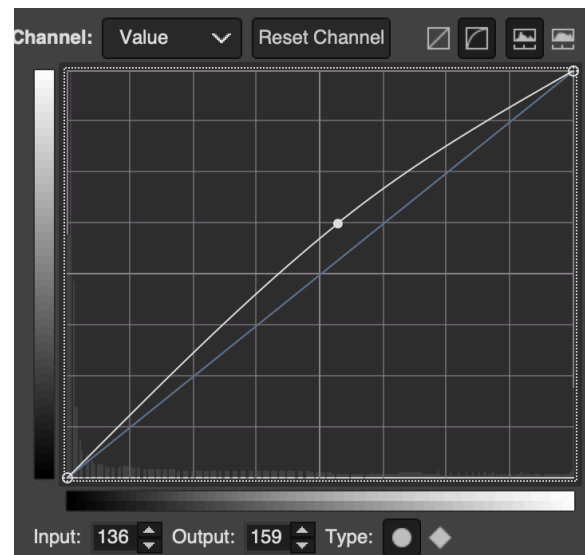
Dry ice is defined as the solid or frozen state of carbon dioxide ( $\text{CO}_2$ ). Dry ice has the feature of sublimation meaning when it heats up it turns directly into  $\text{CO}_2$  gas skipping the liquid phase. A block dry ice has about  $-109.3^\circ\text{F}$  of surface temperature. Therefore, it starts turning to gas as soon as it is exposed to the air, but in our case, we submerged it under water which resulted in a faster transforming which makes the water looks like it is boiling.

### IV. Photo Editing

My picture dimensions are  $4608 \times 3456$  pixels. I did not do any cropping or background editing. However, I felt that I needed to increase the contrast to show clearer colors. So, using GIMP photo editing software, I did so where I increased the contrast slightly as indicated in Fig. 4.



**Figure 3.** Photo before editing.



**Figure 4.** Contrast curve.

## **V. Conclusion**

This experiment helped me gain more knowledge about the sublimation of dry ice by performing and visualizing the phenomenal. Also, it allowed me to test and understand more about the camera settings where at first, I could not capture the colorful vapor, but as I played with speed shutter, I was able to get a better photo of the phenomenal. As for the photo itself, I believe I captured a nice moment of interaction between the water and the dry ice.

## **VI. References**

<https://science.howstuffworks.com/innovation/science-questions/question264.htm>