

## Group Project 3

MCEN 3228: Flow Visualization

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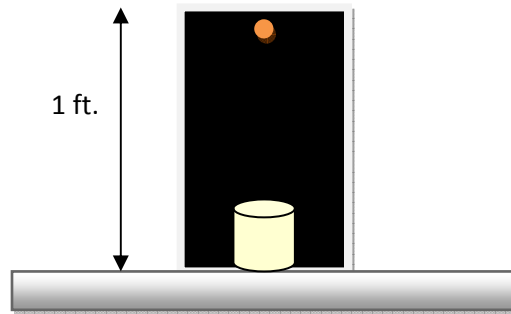


**Figure 1: Crown Effect Produced by Falling Water Droplet**

The intent of team gamma's 3<sup>rd</sup> group project was to explore the fluid phenomena commonly known as a Worthington Jets. Worthington jets can be produced by water drops hitting a liquid surface. Several different liquids were experimented with, such as milk, vegetable oil, and corn starch. Figure 1 illustrates the final image which is not a Worthington jet, but a water droplet crown. This is another phenomena associated with Worthington Jets. It was produced with orange food coloring falling in to Isopropyl alcohol.

To capture the image, a translucent glass filled with Isopropyl alcohol was perched on one of the doors at the ITLL. A black velvet backdrop was then placed behind in order to hide distracting elements. Cameras were placed on tripods in close proximity to the glass in order to resolve as much of the drop in clarity as possible. The method by which pictures were actually captured was a manual process. It was more or less a matter of trial and error. One group

member held the food coloring about 1 foot above the glass and very meticulously created single drops that would fall every few seconds. Other group members tried to effectively time the drop of the food coloring and with the action of snapping the photograph. A schematic of the setup can be seen below.



All of the important image properties can be seen in Table 1. An attachable Nikon SB-28 strobe light was used. Although not documented in the file image, a high shutter speed and a flash was used to freeze the image. Photoshop was used to crop the image and adjust the levels. This effectively increased the contrast making the droplet crown colors more rich and I feel gave the picture more depth. The final image size is 1616 by 300 pixels.

**Table 1: Image Properties**

<b>Photographic Technique</b>	<b>Value</b>
Size of field of view	3 cm by 2cm
Distance from object to lens	1 ft.
Lens focal length	60 mm
Type of Camera	Nikon D200 (10.2 megapixel )
Aperture	f/3.2
Shutter speed	unknown
ISO setting	400

I am very pleased with the final photograph. I feel like there was a good balance between artistic creativity and the driving fluid physics. The photograph for the most part is in focus except for a few trouble spots. This might be due to motion blur or the limited depth of field. If

I were to further explore this phenomenon, I would love to play around with high speed cinematography. I feel this would lend a much greater tool in describing the formations associated with this unique occurrence.