Project 3

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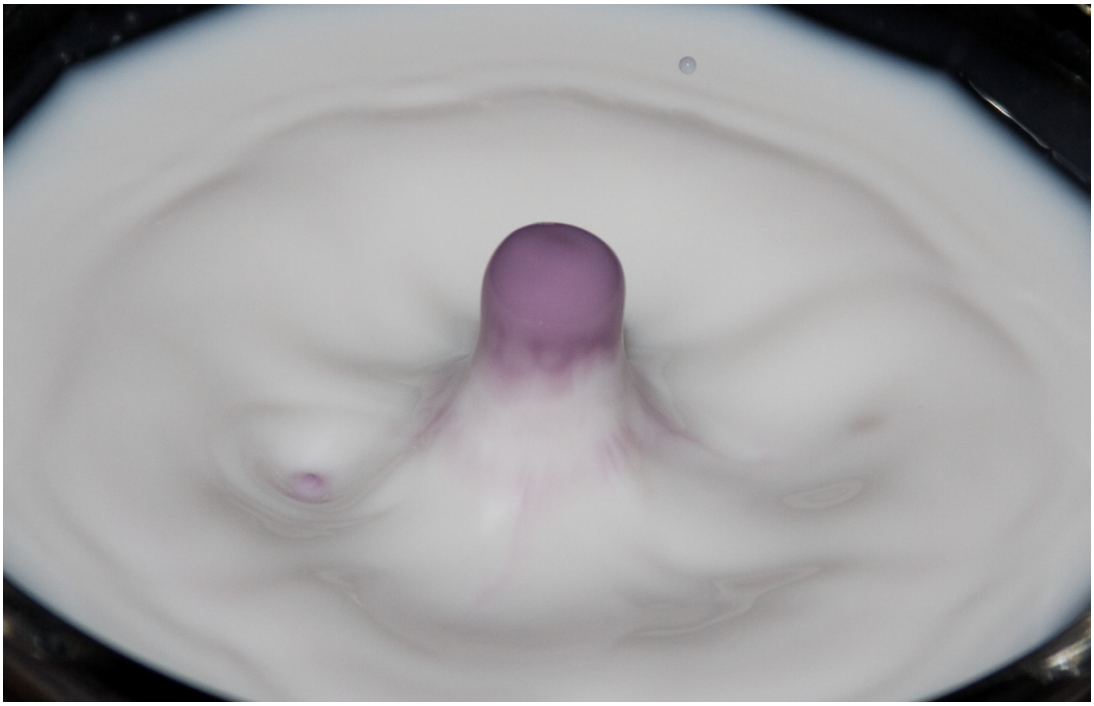

MCEN 4228

Professor Jean Hertzberg

This is the final of three projects for the Flow Visualization course. This image is a continuation of the exploration started in project 2 where a single drop of a fluid was dropped into a reservoir containing the same fluid in order to photograph a crown. The question was raised as to whether the crown was formed by the drop of fluid or by the fluid sitting in the reservoir. When it became apparent that the physics described in report 2 were correct, the focus of this project shifted to the Worthington Jet which formed after the crown.

The set-up for this image was quite simple. A glass bowl containing un-dyed whole milk was placed approximately 3 ft below a syringe containing while milk dyed purple. A single drop of the dyed milk was then dropped into the bowl and the resulting Worthington Jet was photographed. The jet rises about 1.5 inches above the neutral surface of the milk. At the time of the photograph, the jet is just about at its peak height which means the Reynolds number is very low and the flow is in the laminar regime.

To visualize the Worthington Jet a camera was placed on a tripod at approximately 45° above the surface of the reservoir and about 2.5 feet from the Jet.

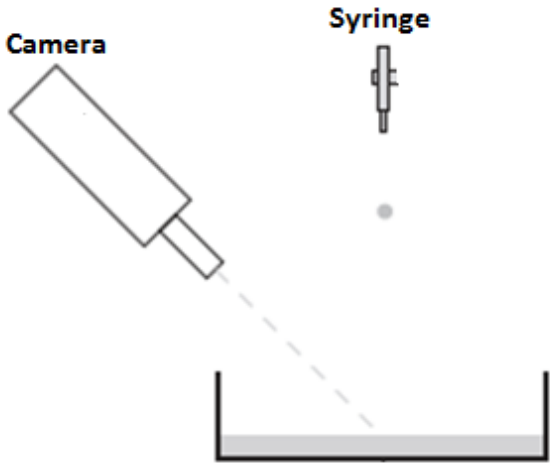

Figure 1: Physical Set-up

There was an external flash triggered by the camera which was direct at an angle toward the Jet. The surroundings were covered by a black cloth in order to create a significant contrast to the milk. The specific photograph and camera details are summarized below.

Table 1: Photographic Technique

Field of View	8 cm. wide by 5 cm high
Distance from object to lens	Approximately 0.5 m
Lens Focal Length	200 mm (28mm – 200mm zoom)
Type of Camera	Canon EOS Digital Rebel
Original Image Width	3456 x 2304 pixels
Final Image Width	1779 x 1139 pixels
Aperture	f/8
ISO	100
Shutter Speed	1/250

There was some Photoshop editing performed on this image. The original image was cropped and a curves filter was applied to improve the brightness and contrast. The image after these two modifications was 1779 x 1139 pixels.

This image shows a Worthington Jet caused by a drop of milk into a bowl of milk. The qualities of this image that I like are the fact that the tip of the jet contains the liquid of the drop (indicated by the purple) as well as the depth provided by the shadows. The physics of the jet are shown quite well in this photograph; however, it would be nice to see a time lapse of the jet forming instead of one single instant in the entire sequence.