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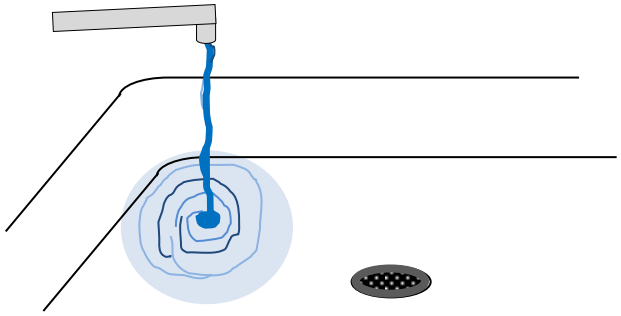
Get Wet Report

For my initial image I played around with capturing food coloring as it dispersed in a variety of fluids ranging from corn syrup to milk. The image I chose to submit was an image I took during the cleanup of my experiments. Although I captured some good images of the food coloring, I was intrigued by the laminar flow of water out of my kitchen sink. With a few quick lighting adjustments I was able to capture the image that I chose to submit.

The flow apparatus used for this image was simply my kitchen sink and its faucet. The figure below illustrates the set up used for this image.



Varying the pressure of the faucet I was able to obtain different properties in the stream of the flow. In particular I wanted to capture the water splashing as it hit the basin of my sink. The flow was low enough where the water did not appear to be forced out of the faucet but was flowing freely. A flow with a low Reynolds number is considered to be steady and non-turbulent or a laminar flow. The Reynolds number is calculated to be:

$$Re = \frac{QL}{vA}$$

In this equation, Q is the flow rate, L is the distance traveled by the fluid, v is the kinematic viscosity and A is the cross sectional area of the flow[1]. Using approximated values of my sink, I determined the Reynolds number to be about 425 which is relatively low. This image also captures the idea of surface tension or cohesion between the water molecules. As the water is falling it is accelerating but instead of breaking into several small droplets its falls into a narrower stream because the water molecules have strong attraction to each other[2].

The flow visualization techniques used in capturing this image were very simple and straight forward. I used the stainless steel sink basin to act as a mirror that reflected the flash of my camera back through the falling stream of water. Although I initially played with various backlights and flash options, the simple point and shoot options provided the best sparkle effect to the water. The bright flash really highlighted the flow giving the image a better depth perspective. I think a colored filtered flash or even a

brighter flash from a different angle could have really improved the contrast of this image.

Lastly, I captured this image with a simple point and shoot camera using the autofocus and macro settings. I used a Casio EX-S770 camera with a shutter speed of 1/60 second. The autofocus settings adjusted the aperture to a value of f/2.7 and the focal length of 6.2mm. The f-stop was f/2.7. The flash was fired but without the redeye reduction feature. The final image was 1123 pixels wide and 1416 pixels tall. A few small color adjustments were made in Photoshop to bring out the blues and improve the contrast of the image.

Overall, I was very pleased with the way this image turned out as it does a great job capturing the flow of the sink. I never thought that the flow from my kitchen sink would exhibit so much physics and beauty. I was amazed to see that in such a small distance it was easy to see the fluid accelerating and the flow narrowing. The flash also highlights the refractory properties of water as the moving flow distorts the light in several different ways. To further this image I would like to play with capturing a variety of different flow speeds and also use brighter, more intense lighting when taking the picture.