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Team Second
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This visual shows a droplet of water colliding with a still water surface. As the droplet hits the surface it creates a small splash that radiates outwards throwing water into the air. The goal of this visualization was simply to see this effect occurring and photograph it.

The set up for this experiment was simpler than expected. A fish tank was placed below a faucet in a kitchen sink, then filled with water as high as possible. A dark piece of cloth was placed behind the fish tank, and a light was placed as close as possible to the site of interest without being visible in frame. We then set the faucet to drip slowly to allow the water surface to still again between droplets.

The droplet experiences two main forces, gravity and a normal force during the collision that forms the splash. By calculating the Froude number and Reynolds number we can determine whether a droplet of water will generate a splash when colliding with a water pool. The Froude number is:

$$F = \frac{U}{(gD)^{1/2}}$$

And the Reynolds Number is:

$$Re = \frac{DUq}{l}$$

Where U is the droplet impact velocity, g is the gravitational acceleration, D is the droplet diameter, q is the liquid density, and l is the liquid viscosity. The water was roughly at room temperature so a density of 998 kg/m^3 and a viscosity of 0.00097 Pa/s. The gravitational constant is 9.81 m/s^2. The droplet diameter is estimated to be 0.01 m and the droplet velocity is estimated to be roughly 2 m/s based on the 20 cm drop. This gives us a Froude Number of:

$$F = \frac{2\ m/s}{(9.81\ m/s^2 * 0.01\ m)^{1/2}} = 6.39$$

And a Reynolds Number of:

$$Re = \frac{0.01\ m * 2\ m/s * 998 kg/m^3}{0.00097\ Pa/s} = 20,577$$

Since the Froude Number between 6 and 18 and the Reynolds number is above 3,000 this collision should generate a splash in the water, and this matches what was observed in the photo.

We used a differentiated boundary technique for this visualization. The water surface refracts the light as it passes through creating a visible sclera against the surrounding air allowing the phenomenon to be seen somewhat clearly. This image was taken in a well lit kitchen, and a bright lamp was placed directly outside the frame of the image to provide more

light as the image was still very dark due to the small shutter speed needed to capture the splash without excessive ghosting.

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| FOV | 1.5 in x 1.5 in |
| Distance | 10 in |
| Lens Specs | 8.8mm  - 36.8 mm |
| Camera Type | Canon Powershot G7X mk2 |
| Image Size Original | 5472 x 3648 |
| Image Size Edited | 1967 x 1873 |
| Shutter Speed | 1/1000 s |
| ISO | 6400 |
| Aperture | f/5.0 |

This image was edited more heavily than I have done on other visualizations. The first thing was to  crop the image in a square to center the flow and cut out the empty space.. Then I used the sharpening tool to more clearly define the boundaries of the water splash. I then increased the saturation of the colors as I felt it helped to create visual interest around the flow. I also masking to remove some small droplets further from the center of the splash that were heavily ghosted.

The image shows the moment after a water droplet collides with a calm water surface creating a small splashing effect. I really like the moment of the collision that was captured. I've seen lots of images slightly later in the series but not this moment. I wish that I was able to capture it with better clarity, but I feel that I encountered the limits of my camera and lens not being the best option to capture this kinda image. With different equipment I feel that the shutter speed could be higher allowing the image to be frozen better, and a different lens could allow for me to focus on the collision better.

Sources:

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Rodriguez, F., & Mesler, R. (1985). Some drops don't splash. *Journal of Colloid and Interface Science*, *106*(2), 347–352. https://doi.org/10.1016/s0021-9797(85)80008-4