Get Wet Assignment

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MCEN 4151: Flow Visualization

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1. Introduction:

This is a description of the image that I submitted for the Get Wet assignment. The content of the image is a drop of black ink in a clear vase of water. The purpose of the image is for us to visualize the Rayleigh-Taylor instability of fluids.

2. Flow apparatus:

The Rayleigh-Taylor instability happens when a lighter fluid is pushing a heavier fluid. (Sharp, D.H. (1984).) It can be observed when dropping a drop of liquid into another liquid with a lighter density. The settling of the fluid drop is affected by gravity and the evolution is very complex.

3. Visualization technique used:

The visualization technique that I used for this assignment is black ink and tap water. I used my wall as the background. Then I dropped one drop of Higgins non-waterproof black ink into the tap water in a clear vase. The lighting that I used was just my desk lamp which uses a LED bulb. I shined the light from the side of the glass vase and directly into the water.

4. Photographic technique:

For this image I used my Canon EOS 60D DSLR camera with a Canon 10-18mm wide-angle lens. To get a clear and sharp image of the fluid's motion, I set up the exposure as 1/15 sec at f/5.6. I set up the ISO to 1000 to ensure there is enough light for the quick shutter speed. I was holding the camera in my hands and the distance from my lens to the vase was 15 inches. The focal length is 17mm. The field of view is 66 degrees horizontal, 47degrees vertical. The dimension of the original image is 5184 x 3456. I used LightRoom as my photo editor. What I did was setting the temperature to 2000; tint to +150; contrast to -64. Then I lowered the first 25% part of the tone curve to the lowest value and I slightly lowered the remaining 75%. I also cropped my image to a dimension of 4564 x 2855.

Original image

Final image

5. Conclusion:

The image successfully revealed the Rayleigh-Taylor instability of fluids. What I'm happy about the image is that it's a clear capture of the fluid's motion. What I don't like about the image is the reflection of the lighting that I used on the up left corner of the image. If I'm going to improve this image I would choose a white card board as my background. I'd also put a thin cloth on my lighting source to avoid high light spot.

6. Reference:

1. Sharp, D.H. (1984). "An Overview of Rayleigh-Taylor Instability". *Physica D* **12**: 3–18