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Get Wet Image, Spring Semester 2018

MCEN 5151
17 February 2018
University of Colorado, Boulder

The purpose of the image was to see things that are beyond what just the eye can see, without assistance. When thinking of flow visualization, I wanted to think of a chaotic flow that has many dynamic characteristics. I wanted to visualize steam that comes from boiling water, but I wanted a way to easily capture that image and make it pop. Steam is normally tough to see, so this image aims to show all of the minute details of a turbulent wake of steam.

I put about a cup of water into a pan on a stove and brought the water to a boil. I covered the pan and removed it, as the steam floated up I took some images, this captured the turbulent wake of steam that rose off of the water. The water has reached a temperature and pressure that equals the ambient pressure, causing the water to change phases into a gas. By covering the pan, I increased the pressure and also kept the steam from escaping. As it released you can see that the steam rose into the lower pressure regions above the pan. To create the image I took a 405 nm laser and attached a cylindrical lens to the beam. This spreads out the beam and makes a laser sheet. This setup can be seen in figure 1. I also have some extra photos posted in my blog where instead of using a laser sheet, I decreased the shutter speed on my camera and moved a 532 nm laser across the flow to show the profile. This is shown in figure 2.

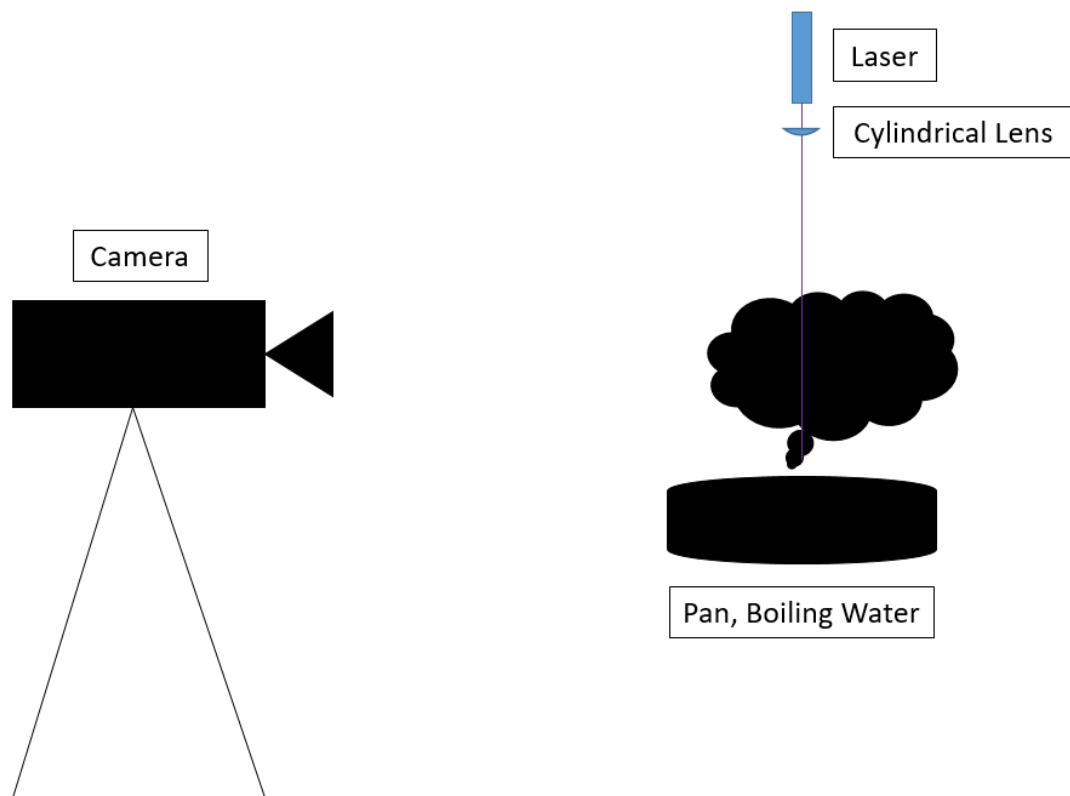


Figure 1. Laser setup with a 405 nm laser and a cylindrical lens to spread the laser light.

The cylindrical lens is spreading out the laser light into the screen, which is why in this figure there is no apparent effect from the cylindrical lens. From the camera's point of view, it can see the laser sheet.

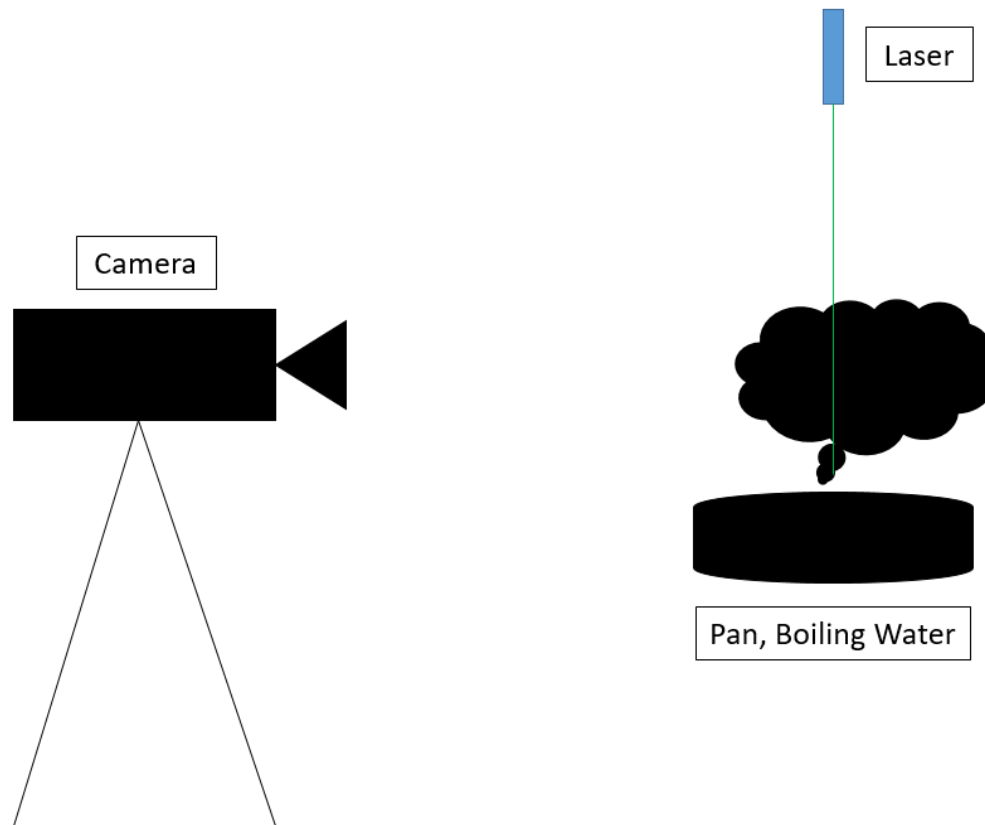


Figure 2. Laser setup with a 532 nm laser, camera set to 1.3 second shutter speed.

The lights in the room were completely shutoff, the only light source in the image was from the laser itself. I wanted this because it is hard to see this flow without special lighting. The lasers I used were from Amazon, manufactured by Feyachi.

I used a Nikon D3000 with an 85 mm lens, which has a focal length of 11.1 inches. This was a fairly reasonable distance to capture the whole profile of the flow. I wanted to get a good image that shows the pan and also the steam that came off of the water. The image was originally shot raw at 3872 x 2592, but I edited the image down to a lower resolution for the web and saved it as a PNG using Adobe Photoshop.

In review of the image, I am glad that I was able to see the turbulent wake of the steam. I think it shows well all of the small eddys and currents that occur in the flow, this definitely was a

great way to visualize flow that normally a human would not be able to see. I wish that my laser emitted light more frequently, in the green laser images you can tell that the laser was pulsing and was not a continuous stream of light. This was not a problem when using the cylindrical lens with the purple laser. I may redo the images once again in my spare time to see how the green laser looks with the lens.