

Team 1st 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 Team 1st assignment. The content of the image is a simulated fire whirl. The purpose of the image is for us to visualize the fire whirl.

2. Fire whirl

The fire whirl is a “whirlwind induced by fire and often made up of flame or ash” according to Wikipedia from https://en.wikipedia.org/wiki/Fire_whirl. The whirling wind sucks the flammable liquid into the vortex. Once the liquid lights up, the fire whirl is generated.

3. Visualization technique used:

The visualization technique that I used for this assignment is to use a spin table, a small liquid container, medical alcohol and a metal basket. A sketch of the set-up is shown below in Figure 1. I set the spin table on the floor with the liquid container on it. Pour Kroger 75% medical alcohol into the container until half full. Then I lit up the alcohol with a match. The last step is to spin the spin table and put the metal basket around it. This way I can simulate the fire whirl. The estimated rotational speed of the spin table is 1.5 rev/sec.

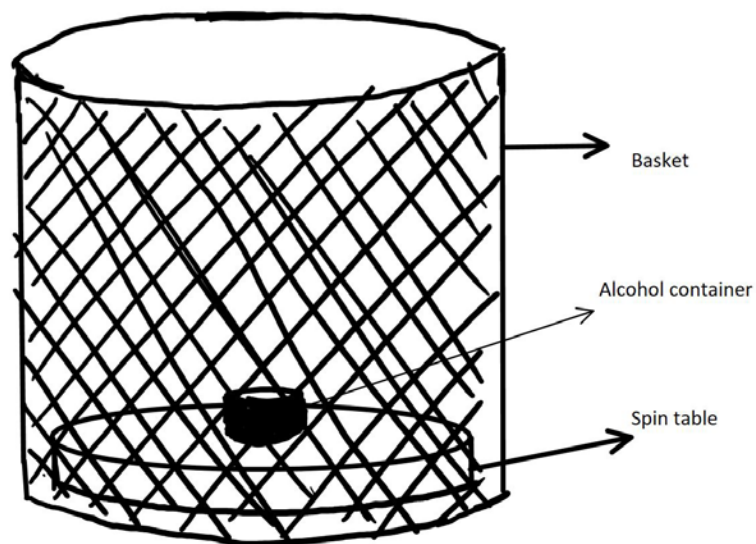


Figure 1: Set-up

4. Photographic technique:

For this image I used a Canon EOS Rebel T2i DSLR camera. To get a clear and sharp image of the fluid's motion, I set up the exposure as 1/250 sec at f/5.6 44mm. I set up the ISO to 800 to ensure the enough light is censored for the quick shutter speed. I was holding the camera in my hands and the distance from my lens to the flame was 15 inches. The focal length is 17mm. The field of view is 66 degrees horizontal, 47 degrees vertical. The dimension of the original image is 3456 x 2304. I used Adobe Photoshop as my photo editor. What I did was cut the fire whirl and paint the background pure black. Then I adjusted the color temperature to make the fire look more yellowish. I also cropped my image to a dimension of 2043 x 1285.



Original image



Final image

5. Conclusion:

The image successfully visualized the simulation of the fire whirl phenomenon. The flame is much taller with the vortex because the vortex sucks the burning debris and combustion gas to higher positions. What I'm happy about the image is that it's a clear capture of the fire vortex. What I don't like about the image is the metal basket still shows in the front of the image and it's very distracting. If I'm going to improve this photo I would try using a transparent cover instead of the metal basket to get rid of the shade in front of the picture.

6. Reference:

1. Wikipedia, *Fire Whirl*, https://en.wikipedia.org/wiki/Fire_whirl.