

Get Wet



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Introduction

For the first “Get Wet” assignment I chose to capture the image of a smoke plume. I love watching fire and smoke and believe the flow of both of these exhibit very similar patterns and images. Smoke, however, is slower and for this reason I chose to capture images of the flow of smoke plumes. The setup of this experiment was at my house in my living room, and I burned what is called Palo Santo wood.

Physics

While a smoke plume is rather difficult to quantify the phenomenon occurring, there are some explanations available. The conditions in the location at which I took the image were calm, indoors, and contained. There were no windows open, and I was in the main living room of my home.

It is hard to find material on the actual physics behind a relatively calm smoke plume, but a book I read several years ago may lend some insight to the phenomenon occurring. “Chaos: Making a New Science.” by James Gleick, is a book about the relatively new science of Chaos Theory. I am not going to cite any lines in particular, but what I do know from this phenomenon I know from this book. Chaos theory, or also known as “The Butterfly Effect” is a study of systems, and how minor fluctuations within a system can have a domino effect to create greater changes within that system. Chaos theory is commonly used within meteorology, and is a good explanation of why our weathermen are so wrong some of the times. Minor heat changes in different regions, or even things as simple as a fire can change the flow of weather patterns dramatically.

Chaos theory can be seen here as well on the micro level, as opposed the macro level of meteorology. Although the conditions within my house seem to be calm, the minor leaks, temperature changes, or even my breathing can change the vector field of seemingly stagnant air. I ended up taking about 50-75 photos, and not a single one of them look alike. The smoke plume displayed random vortices, smooth laminar flow, turbulent flow, and everything in between.

The setup that I used was very simple and not necessarily technical at all. I used a nerf gun to hold the smoking piece of wood, I set up the nerf gun on an ottoman, and set up black IKEA shelves behind the whole setup as can be seen below.



Visualization technique

For this particular experiment I used a piece of wood known as Palo Santo wood. Commonly used for purposes such as holistic, ceremonial, and for the smell of the incense this wood when lit on fire then blown out creates a good amount of smoke. The bluish hue of the smoke creates a very cool plume, and due to the dryness of the wood it will smoke for several minutes. For this project I used the natural lighting of sunshine shining through my living room. I waited until 3:30-4:30 in the afternoon in order to get the angle of the sunlight that I was aiming for. The conditions in my living room were seemingly stagnant with no windows open and no other air sources present to perturb the flow. The only air that could have been coming in to disturb the flow would be the inherent leaks of an old house.

Photographic Technique

For the particular image that I ended up using for the “Get Wet” assignment the field of view is approximately 4-6 inches. I initially started closer up to the smoke plume and the contrast between the background and the white smoke wasn’t as stark or sharp as I had been hoping for. From this I backed away from the plume about 3-4 feet and zoomed all the way in on my lens. I used a digital camera, the Olympus PEN E-PL5, with an Olympus 14-42 mm, 1:3,5-5,6 and 37 mm diameter lens. For the actual image I used an aperture of f/3.2, a shutter speed of 1/100 s, an ISO of 200, and a focal length of 35mm. For editing I simply cropped the bottom and right part of the image out in order to center the smoke plume in the frame. These changes were made based off of some suggestions to do so after the critique session, and I am happy with the result.



Figure 1- Original



Modified

Image Results

Overall, I can say that I am very happy with the results of the “Get Wet” assignment. I went into the project trying to capture the beauty and complexity of a smoke plume and I believe that I accomplished that. Smoke can be laminar, turbulent, and have random vortices all in the same plume. I love the smoothness of the smoke picture and the different densities in the smoke as illustrated by the different shades of white throughout the photo. Besides the explanation through Chaos Theory that I came up with, I don’t know entirely the physics that smoke

plumes experience. I would like to know more about why plumes are seemingly smooth one second, and then the next they are turbulent or creating really cool vortices. If I were to try and improve on the image I think I would maybe like to keep going with the method I had been using, but trying to get more of the plume in as good of focus as the rest of the image. This was a challenge because of the different depths of the smoke plume, but if more work were to be done on this I believe it could be solved.

References

Gleick, James. *Chaos: Making a New Science*. New York, NY: Penguin, 2008. Print.