

Guy Casavan

2/13/12

Film 4200

Get Wet Report

This was the first project for the Flow Visualization course, in which we were to “get our feet wet” in respect to artistically representing fluid mechanics phenomena. The phenomenon I chose to capture was that of a flame traveling down the evaporated wax vapor from a recently extinguished candle, which then reignites the candle wick.

For this project, I used a standard candle (2.5 in. x 4 in.) lit with a flame that was approx. 1 in. tall. The catalyst flame used to ignite the wax vapor and wick was held about 1.5 in. away from the wick on the final shot, and the others varied from roughly .5 to 1 in. away. The reason that the flame is able to reignite the candle wick without touching it is because as a candle burns, it melts the wax, which is only moderately flammable in a solid state, but in a gaseous state is highly flammable.¹ When the wick is extinguished, there is wax vapor still trailing from the hot wick, and when a flame is held in the trail, the vapor is ignited, and the flame quickly travels down the trail to the wick, which is coated in wax, and therefore easily reignites.¹ The wax vapor is flammable enough that it allows the flame to overcome gravity and the momentum of the rising gases and in order to travel downwards towards the flame, but the ability of the flame to do this depends on the concentration of the flammable gas and the distance from the catalyst flame to the wick.¹

In order to visualize this effect properly, there were several steps that needed to be taken. The flame itself provides the primary light of the shot, but the contrast needed to be heightened in order to see the smoke that was essential to the phenomenon being demonstrated and to create a focus on the flame rather than ancillary objects in the frame. First, I used a black foam board in the background to allow the flame and smoke to stand out. Second, I used secondary lighting from the side so that the background wasn't brightened, but so that the smoke could be better visualized when the candle was extinguished. The secondary lighting came from a small desk lamp that was diffused with a lampshade in order to lessen the effect the light had on the candle itself and the background.

The size of the field of view is roughly 7 in. x 4 in., but this changes throughout the different shots used. I chose this field of view because I felt it gave the viewer a close-up view of the flame, but also allowed for the smoke to be visualized in the top half of the frame, while the flame was located in the center. Varying sizes of field of view were used to keep the image from becoming stagnant as the shots progressed. I chose to use video instead of still photography because I felt that a single picture, or even a progression of pictures, didn't fully demonstrate the phenomenon being observed. The distance from the flame to the lens was about 1ft., with the focal length being approx. 51mm. All this contributed to the macro view of the flame, in order to enhance visualization of a relatively small process which was occurring. The camera used was a digital video camera (Panasonic HMC-AV150) with the original and final images both being 1920x1080 pixels, with no cropping occurring, but rather a rotation of the frame, as the shots were taken with

the camera on its side. The shot was taken at f3.9, 1/30 sec. shutter speed, 29.97 frames per sec., and an unknown ISO. The brightness of the image was raised in Final Cut Pro in order to better visualize the smoke, but other than that, the colors were left alone in order to avoid over stylization of the image becoming apparent in playback, which I believe tends to become more obvious and distracting in moving images than it does in still photographs. Image speed was also altered in post production in the last shot in order to better visualize the flame travelling down the wax vapor, because in real time it is hard to see properly.

Overall I am very happy with the way my image(s) turned out. I like the framing of the shots, and the way that the phenomenon can be visualized up close. I would, however, like to capture this again on a high-speed camera so that the flame travelling along the gas can be better visualized in slow motion, because my camera does not have the capabilities to do this. I think that this will add extra “wow” factor to the image and also allow for further analysis of the demonstration. My only questions are how far away from the wick I can successfully reignite the flame, so that there is more time that the flame is suspended in midair, allowing for further suspense and intrigue. That being said, I am still extremely happy with the way my project turned out, and I am happy to have taught many of my classmates something new in the world of fluid dynamics phenomena.

Bibliography

¹ "Weird Science: Jumping Flame." *Oceanit Website*. Oceanit. Web. 13 Feb. 2012.

<http://www.oceanit.com/index.php?option=com_content&task=view&id=914&Itemid=170>.