Jason Carranza
420-576
Flow Visualization
5/3/10

Team Image 3 Report

This image was taken for the third group image project. Unfortunately, after being ill for quite some time, I had to set up and take the image at the same time by myself. I was trying to capture the strange flame phenomena that can be viewed whilst heating glass in a propane torch's path. The end result depicts the flame's beauty wonderfully.

I used a Worthington Pro Grade propane torch to create the flame. It is capable of outputting a flame at temperatures of around 3600 degrees Fahrenheit [1]. I then inserted a glass pipette, with a 0.3 inch diameter glass sphere on the end, into the flame. It was inserted in the flame just after the largest blue cone dissipates. The glass pipette had a 90 degree bend in it and was about 12 inches long total. This allowed me to keep a safe distance while working with the open torch flame. Leather gloves were also worn by myself for further protection. In the image, you can see the flame turning from blue to orange as it passes over the glass sphere. I believe this is caused by the heat transfer from the flame to the glass. The blue flame loses heat to the glass it is passing over, causing it to decrease in temperature and change to the orange color. Also note how the path of the flow of the flame changes. Towards the bottom of the image the flow creates a sort of outward flare right below the location of the glass sphere. This is caused by the flow layers of the flame being altered by the position of the glass sphere within the flame.

No special visualization technique was used. The torch was lit and set standing upright. The glass sphere was then placed in the flame. The picture was taken from a distance of one foot directly behind the flame, and one foot above the horizontal looking down at the occurrence at an angle of 20 degrees. No flash was used for this image, only the light that was being emitted from the propane torch was utilized.

The size of the field of view from the top to the bottom of the image is 2 inches. The distance from the flow occurrence to the lens was 1.4 feet approximately. The lens focal length was 6 mm and the F-number was F/3.8. The camera used was a digital Nikon CoolPix S60. The original image had a height and width of 2736 x 3648 pixels. The final image has a height and width of 741 x 3648 pixels. The exposure time was 1/5 of a second and an ISO setting of 800 was used. The only manipulations made to the original image were cropping, that was done in Microsoft Office Picture Manager. The image was also rotated 90 degrees in the clockwise direction.

The image reveals a beautiful light show that intertwines the play of the propane flame and the glass sphere that it is heating. I absolutely love the colors and contrast that the image reveals, but wish the focus could have been a little clearer. I believe that the fluid physics are very well shown and that my intent was fulfilled. To develop this idea further I would definitely like to have at least one other person helping me to set up the flow apparatus and to use multiple propane torches to see how the flames interact with each other when placed in the same flow paths.

[1] http://en.wikipedia.org/wiki/Propane_torch