

Team 3rd Assignment



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MCEN 4151: Flow Visualization

Fall 2015

12/12/2015

1. Introduction:

This is a description of the image that I submitted for the Team 3rd assignment. The content of the image is a flame in a dark room. The purpose of the image is for us to visualize the color of the flame.

2. Flame color

The color of a flame is mostly depended on the black-body radiation and spectral band emission according to Wikipedia. In our case, the flame color is mostly depended on the oxygen supply and the extent of fuel-oxygen pre-mixing.

3. Visualization technique used:

The visualization technique that I used for this assignment is to light up a dry pinecone dipped with 75% Kroger medical alcohol. Other pieces of equipment that I used for this project are: a metal dish and a piece of aluminum foil. For safety concerns I also have a portable fire extinguisher in case any fire accidents happens.

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 1/160 sec at f/5.6 41mm. I set up the ISO to 3200 to ensure that 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 field of view is 30.3 degrees horizontal, 20.46 degrees vertical. The dimension of the original image is 3456 x 2304. I used Adobe Photoshop as my photo editor. What I did was adjust the curve to get the yellow flame color a lit more warm. The final dimension of the image is 3456 x 2304.



Original image



Final image

5. Conclusion:

Through this project we successfully visualized the color of the flame. The flame color around the pinecone has a blue tint, while the color on the outer portion of the flame is yellow. This is because at the pinecone surface the alcohol doesn't have enough oxygen to mix with. The flame temperature is lower at the inside so there is a blue tint. As the alcohol molecules diffuse to the air, more oxygen mixes with the alcohol molecules so the flame becomes hotter. The yellow flame has a temperature near 1000 degrees Fahrenheit.

What I like about the final image is that the flame is in focus and the background is black and clean. However, I think a whole view of the flame would be better.