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"Get Wet" assignment 1 report
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This image was created for Profs Hertzberg and Sweetman's Flow Visualization course at the University of Colorado at Boulder. The image is of a wood fire in a fireplace, illustrating rising gas flows resulting from combustion. It was modified in photoshop, but only in color. There was no distortion of the original image. The checkering throughout the image is the fireplace screen which prevents sparks from landing on the floor.

This fire was made with very dry construction debris. Pine 2"x4" boards were cut to approximately 12" sections. 8 of these small sections were used in this fire. When this picture was taken, the fire had been burning for approximately 45 minutes. Based on the color of the unmodified image, I estimate the combustion temperatures to be approximately 1200 degrees F. Based on observations of the gas rising, I estimate the flow speed at 1 meter per second, and my observation frame was .5 meters. Based on the elevation and temperature, I estimate the kinematic viscosity at 18.2x 10^-5 m^3/s. Based on those numbers, the resulting Reynolds number is Re=(Velocity*length/ kinematic viscosity) or (1 * .5)/(18.2 x 10^-5)= 2747. This would indicate laminar flow, which is what the photograph illustrates.

The visualization technique used in this photo was partly smoke flow, but mostly purely observation of the combustion behavior. The room was darkened, so the only illumination came from the fire itself. No flash was used, but I did experiment with the use of the flash. There was a lot of infrared radiation from this fire (as with most fires), so a very small proportion of its energy was visible light. I don't think that digital camera images are affected by IR radiation, but it would be interesting to see what the image would look like if they were.

The viewing area of this image is approximately 1 m x .5 m. I shot at 1/8 sec shutter speed at f 2.8. Focal length was 5.8 mm, and I was 1.5 meters from the fire. The flash did not fire, and my ISO was set on auto. The original image was captured at 2592 x 1944 pixels at 180 pixels per inch. The camera was a Canon PowerShot SD400. Photoshop was used to change the color profile of the image. An uncorrected/uncropped image has been attached to this report.

I am colorblind, so I find it fun to mess with the colors of my images. Sometimes they come out fairly normal, other times they're way off. In this image, I tried to make the top image look fairly realistic by correcting based on the color curves to account for clipping and missing information. In the second iteration, I had some fun with the colors, seeing what I could come up with. This is not the way I saw the real image, but it is interesting for me to note how the different colors bring out different contrasts and detail in the flames. Finally, I made the last iteration black and white because it again revealed different details, and because that puts me and the rest of the group on equal footing as far as appreciating the colors. I would like to develop this idea of looking at combustion further by observing and photographing explosive combustion.