

Travis Brown

Team 3 Report

Flow Visualization – Spring 2012

Toothpick Flame

The intent of this image was to determine what type of flame would be produced by lighting the end of a toothpick. After lighting multiple toothpicks to see the variations in flame I arrived at this image, which I felt most affectively displays the laminar flame coming from the toothpick.

My image displays the phenomena of laminar flow in a flame. Laminar flow occurs when particles within are moving parallel to each other. Laminar is often referred to as a 'smooth' flow. The flame in the image takes on this smooth look as it rises from the top of the toothpick (which is slightly out of the frame). It maintains fine edges even as it curves. This provides a good visualization as the particles remain parallel even with motion. The flame rose to about 2 inches from the top of the toothpick and had a width of about $\frac{1}{4}$ of an inch.

At the time of the image capture there were no outside conditions acting on the flame. It was set up inside with no wind to effect it. The only lighting in the room came from moonlight shining through a nearby window and the light from the flame itself. This helped to get the drastic contrast from flame to background. The toothpick being burned was stuck in to a candle so it would stay standing upright while lit. This would allow the flame to burn consistently.

The final image resolution came to 6802 x 5005 px and was shot on the Canon EOS Digital Rebel XTi. The focal length was set to 33 mm which allowed me to capture an area of about 4" x 2" from a foot away. With a very low-lit scene I had to set my F-number at 4 to allow as much light in as possible. Finally, my exposure time was set to 1/320 s in order to catch the flame in its most natural state, before shifting position. No post-production changes were made except for a minor cropping.

The intent to capture a laminar flame flow in the image was successful. The strong contrast between the flame and the background bring out the detail. Its smooth curves and absence of ripples make it apparent that the flame is in fact in a laminar flow state.

