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Flow Visualization
Get Wet Assignment #1
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The purpose of the first flow visualization assignment was to capture a fluid flow using an imaging technique. The imaging technique could be a stereo 3-D image, camera or video. The fluid flow can be any interesting fluid flow. An interesting fluid flow of my choice was foam created by soap bubbles. Foam is defined as a substance with many trapped gas bubbles in a liquid or solid (Wikipedia, Foam). Foam is an interesting substance because of the appealing appearance and the ability to show different fluid flows. Using foam, fluid flows such as an impinging jet can be observed. An impinging air jet was used to manipulate the foam and this fluid flow was captured with a camera.

A flow apparatus was constructed to show how impinging air jets affect foam bubbles (Appendix A). The flow apparatus consisted of a plate of soapy water. Soapy water was mixed to form foam on the plate. An appealing blue plate was used to give the picture the desired contrast and color. The blue color of the plate made the foam soap bubbles easy to see and to observe. An impinging air jet was then used to manipulate the foam on the plate. The foam held the desired shape very nicely and allowed for a great picture.

To recreate the flow visualization, the following steps should be completed. First, choose a standard plate or bowl that can hold a liquid. Choose the plate carefully because the plate will control the overall color and contrast of the picture. Place the plate on a white background to effectively control the light. To insure a good amount of bubbles, dilute 2 parts water with 1 part dish detergent on the plate. Mix the liquid to create as much foam as possible. Place the camera on a tripod, pointed straight down at the plate of foam. Place proper lighting above the plate and camera. Using a straw, create an impinging air jet that flows onto the foam. Using the jet, move the foam to a desired shape and take picture.

The following photography techniques were used to create a beautiful picture. The camera used was a Nikon CoolPix D90. A tripod was used, with a height of 14in pointed straight down to a plate of 8.5in diameter. Two 15 Watt fluorescent light bulbs were placed 60 in above the camera and plate for lighting. After adjusting the white balance the camera was set to the following setting.

Camera Settings:

Exposure: 1/10 sec

F-Stop: 4.0

ISO: 200

Focal Length: 18.8mm

This lighting and camera setup allowed for a picture to be taken with nice exposure, contrast and focus.

Post production work in Photoshop version 2.0 consisted of the following; cropping and paint tool. Cropping changed the image size of the picture. The initial image size was 4000 X 3000 pixels. After cropping the final image size was 3475 x 2317. I used the eyedropper and paint to cover a small glare on the top center of the picture. Using these photography techniques flow visualization was completed.

The image reveals a break in the foam created by an impinging jet. The foam opens up to form a hole due to the jet. Through the hole in the foam, the design of the plate is revealed. The color of the picture turned out really well due to the blue plate. Also, the contrast turned out really well. A question I have is how to take pictures on my camera in RAW format. I think I can only take pictures in JPEG. I think the flow physics turned out really well. I think it would be cool to improve on this by using a lot more foam, maybe a 10 ft by 10 ft box of foam. Overall I think this experiment turned out really well.

Resources

Wikipedia. "Foam." Wikipedia The Free Encyclopedia.

<http://en.wikipedia.org/wiki/Foam>

Appendix A

Flow Apparatus

