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Group Assignment #3 Report
4/5/10

Non-Newtonian Fluid

Working with the vibrating table, properties of non-Newtonian fluid can be observed for MCEN 4228 Flow Visualization, Group Assignment #2. Non-Newtonian fluid was created using corn starch and water and placed on a vibrating table. The table was vibrated at a certain frequency and the fluid acted in a fascinating way. A camera was used to take still images of the interesting flow that was created when the non-Newtonian fluid was place on the vibrating table.

The non-Newtonian fluid was placed in a pan and attached to the vibrating table. When the vibrating table was turned on the fluid became excited. The fluid started to grow spikes of different formations. The spikes were approx. 0.75in tall and covered a 2 in diameter area. The spikes continually changed shaped but covered approx. the same height and area. The spikes lasted as long as the table vibrated. Food coloring was added to show the texture and the movements of the non-Newtonian fluid. The vibrating table can be used to created awesome looking spikes in non-Newtonian fluid.

The flow apparatus consisted of the proper mixture of non-Newtonian fluid and the proper frequency on the vibrating table. The non-Newtonian fluid was created with 2 parts water and 1 part corn starch. 8oz of water was mixed with 4oz of corn starch to create 12oz of non-Newtonian fluid. The fluid was then placed in a 9in diameter cooking pan which was screwed onto the vibrating table (See Appendix A). The Aps Electro Seis Vibration Shaker was connected to the Agilent 33210A waveform generator which was set to create a sine wave with a frequency of 45Hz and peak to peak amplitude of 2 volts. Using the properly mixed non-Newtonian fluid and correct frequency on the vibrating table, interesting effects can be observed.

To capture the non-Newtonian fluid a digital film Nikon Coolpix P90 camera was used. The camera was placed 1.5 ft above and 0.5 ft behind the subject. The subject had a size of view of 8 in. A 500 watt light was place above the camera and the photo was shot was a shutter speed of 1/800sec, f/stop of 4.5 and ISO of 200. The lens had a focal length of 37.7mm. The final image size is 6000x4000 pixels and Photoshop was not used. The camera specs allowed for a picture with good focus and exposure.

The image reveals how non-Newtonian fluid acts so differently from a liquid, solid or gas. I like how the red and blue dye mix and moved during the shaking. I have more questions about why non-Newtonian fluid acts the way it does. For further investigations more experiments could be done on non-Newtonian fluid.

Reference:

Non-Newtonian Fluid, Wikipedia.
http://en.wikipedia.org/wiki/Non-Newtonian_fluid

Appendix A