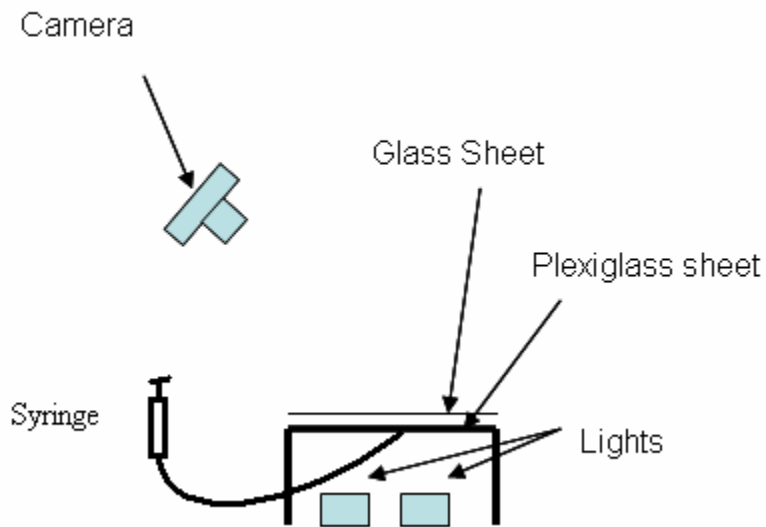


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Group Project 1  
10/20/04

The purpose of the image was to capture the characteristic behavior of the Saffman-Taylor instability. The image was taken on the Saffman-Taylor instability device and gives a good example of the finger patterns that are formed by this phenomena.

The flow apparatus used was the Saffman-Taylor instability machine. A sketch of the setup can be seen below



**Figure 1:** Experimental Set-up

The machine has a plexiglass sheet with a small hole in it, and fluid can be injected through the hole onto the surface. A sheet of glass sits on top of the plexiglass. A viscous fluid is then placed between the glass and the plexiglass and a less viscous fluid is

injected into the middle of the more viscous fluid. The injection causes the patterns to form. Lights are placed underneath the stand for the apparatus and provide light through the translucent plexiglass. The image is of fluid which is moving fairly slowly (probably about 0.25 ft/sec), therefore the image has good time and spatial resolution since it was shot at a shutter speed of  $1/125^{\text{th}}$  of a second.

The flow was visualized using dye in the less viscous fluid (water). A large amount of dye had to be used for good visualization since only a thin layer of water was being photographed. The viscous fluid was green soap, and was not dyed.

The image shows a field of view of about 8 in. by 10 in. The object was 3.5 feet from the lens, and the lens focal length was 100mm. The camera was a 35mm film Olympus OM-10. The aperture was set at f-stop 2.8 and the shutter speed was  $1/125^{\text{th}}$  of a second. The film was Kodak ISO 400 color film.

The image reveals the patterns created by the Saffman-Taylor instability, as well as some mixing of fluids after the instability has taken place. The finger shaped patterns are interesting because they show the typical pattern associated with this type of phenomena, but the mixing is also interesting because it shows what happens when the less viscous fluid reaches the boundary of the more viscous fluid.