



Saffman–Taylor Instability in a Hele-Shaw Cell

Submitted by

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Glycerin dyed with food coloring was pressed between 30 cm² acrylic sheets. Water was injected through a 3.2 mm orifice, displacing the glycerin. The interface between the two fluids formed “fingers” via the Saffman–Taylor instability.¹ Due to viscous effects at the walls, not all of the glycerin was displaced from an area, resulting in the color gradients behind the front.

This image was produced by students in an unusual course, “Flow Visualization: The Physics and Art of Fluid Flow” in Spring 2003 at the University of Colorado.² Co-taught by a Mechanical Engineering professor, Jean Hertzberg, and a Fine Arts Photography professor, Alex Sweetman, the course brought together photography and en-

gineering students in truly multidisciplinary teams. This course represents a radical departure from traditional curricula in both art and engineering. The engineering students were encouraged to produce images with beauty and impact, as well as technical excellence; at the same time the art students were expected to grasp optics and fluid physics and to fully document their work. Course content included fluid flow physics, flow visualization and photography techniques, and the history of photography with respect to the relationship of science and art. Issues such as “What makes an image art? What makes an image scientific?” were addressed. Students responded by producing a range of both classic and novel flows and techniques, including the use of environmentally benign materials.

¹P.G. Saffman and G.I. Taylor, “The penetration of a fluid into a porous medium or Hele-Shaw cell containing a more viscous liquid,” *Proc. R. Soc. London, Ser. A* **245**, 312 (1958).

²<http://www.colorado.edu/MCEN/flowvis/>.