

Abstract Submitted  
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**Make a Pancake: Learn About Viscosity** ROBERTO ZENIT, A. H. KUMAR, A. MANSINGKA, T. POWERS, M. RAVISANKAR, A. SOLLENBERGER, P. TIEZE, Brown University — One of the most important fluid-mechanical concepts in an introductory class is the fluid viscosity. While other properties are more intuitive, such as density or surface tension, viscosity is hard to assimilate: its units do not offer an immediate physical measure of its meaning and its formal definition is convoluted. In an effort to make our teaching laboratories adequate for the health emergency, we have completely redesigned them to be conducted individually at home. To learn about viscosity, instead of the classical sedimenting-sphere experiment, we ask the students to make pancakes: rapidly pour a known volume of any viscous kitchen fluid onto a horizontal surface. Using a phone to video-record the experiment, the time rate of change of the circular fluid blob radius can be determined with standard image processing techniques. By fitting the data to the viscous gravity current model by Huppert (JFM, 1982),  $R(t) \sim (\rho g V t^3 / \mu)^{1/8}$ , it is possible to infer the value of viscosity. It works! Using oil, syrup, honey and, of course pancake batter, the students successfully measured the fluid viscosity (within the small-Re, large-Bo regime), with notable accuracy and repeatability. This simple flow, surprisingly, has rarely been used as teaching tool.

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