

Abstract Submitted
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Using Coffee to Teach Fluid Dynamics WILLIAM RISTENPART,
University of California Davis — Fluid dynamics courses at the undergraduate level typically require a full year of calculus and physics as prerequisites. Accordingly, it is typically considered difficult to teach either first-year students or non-STEM (general education) students much about fluid dynamics. In this talk, we describe how brewing coffee serves as an engaging and hands-on introduction to fluid dynamics for students who have no calculus or physics background. Specifically, we use an AeroPress coffee brewer to introduce Darcy's law and the key concepts of pressure drop, flow rate, viscosity, and permeability. Students apply a pressure by hand to a brewer placed on a standard bathroom scale, while simultaneously measuring the average flow rate out of the brewer. Measuring the thickness L of the spent moist grounds allows students to plot the flow rate versus the applied pressure drop P/L for different applied pressures and/or coffee masses, typically yielding a nice linear trend. Experiments with different grind sizes allows the impact of permeability to be explored quantitatively by linear regression. Importantly, the students can also taste the impact of the flowrate on the sensory qualities of the resulting brew, providing a memorable and highly caffeinated learning experience.

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