**Department of Mechanical Engineering Seminar**

2PM, 11/17/2022 Thursday

Steinman Hall Room 254 (Conference Room)

<https://ccny.zoom.us/j/81357159148>

**A picture containing person, person, smiling, posing

Description automatically generatedHow Do Drops Shape the World around Us?**

Dr. Vanessa Ruth Kern

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**ABSTRACT**

The motion of a drop subject to an external force is ubiquitous in our everyday life, from rain splashing off a bird to a drop of ink printing onto a page. This talk will be broken into two parts. First we’ll focus on inviscid, inertial drop behavior. We’ll discuss how a drop inertially impacting a solid surface in the normal and oblique directions will vibrate in similar shapes as those predicted by sessile drop theory and how we can use the motion of a vibrating drop’s contact line to understand the constitutive law relating the drop’s apparent dynamic contact angle to its contact line velocity. We’ll find we are able to extract mobility parameters like those described by the Davis-Hocking model, and that mobility parameters extracted in this fashion can be used in simulations of drop-drop coalescence to accurately predict inertial post-coalescence dynamics. Second, we’ll briefly consider the case of two coalescing yield stress drops and show how the height of the bridge formed between them evolves similar to a Newtonian fluid, before arresting at long time due the fluid’s yield stress. We’ll find a model for the arrested interface shape based on the balance between capillary pressure and yield stress and solve numerically for the final arrested profile finding it to depend on the fluid’s yield stress, the drops’ surface tension and the coalescence angle, represented by a modified Bingham number. We also present a scaling argument for the bridge’s temporal evolution using the length scale found from this arrested shape analysis and present a similarity solution for the spatial evolution of the liquid bridge.

**BIO**

Vanessa Kern is currently a post-doctoral researcher working with Professor Andreas Carlson in the Mechanics section of the Math department at the University of Oslo in Oslo, Norway. She received her Bachelors in Chemical Engineering from Lehigh University, Pennsylvania and her Ph.D. from Cornell University, New York.  She is an experimentalist whose focus is low-gravity/small length scale capillary fluid flows. Her current research focuses on the capture of fog from the atmosphere to relieve water scarcity in dry climates, as well as other problems in soft wetting, drop interactions with fibers and the motion of yield stress fluids. Her doctoral research focused on the mobility of a drop's contact line in inviscid inertial systems such as the impact of a drop with a solid surface, as well as the vibrations of an inviscid drop's interface.