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The Dueling Bubble Experiment ANSHUMAN ROY, MARCOS BORRELL, JOHN FELTS, GARY LEAL, University of California, Santa Barbara, AMIR HIRSA, Rensselaer Polytechnic Institute — When two drops or bubbles are brought into close proximity to each other, the thin film of the fluid between them drains as they are squeezed together. If the film becomes thin enough that intermolecular forces of attraction overwhelm capillary forces, the drops/bubbles coalesce and the time it takes for this to happen, starting from the point of apparent contact is referred to as the drainage time. One practical version of this scenario occurs during the formation of foams, when the thin film forms between gas bubbles that are growing in volume with time. We performed an experimental study that is intended to mimic this process in which the two drops (or bubbles) in the size range of 50-100 microns diameter are created by oozing a liquid/gas out of two capillaries of diameter less than 100 microns directly facing each other and immersed in a second fluid. We present measurements of drainage times for the cases of very low viscosity ratios PDMS drops in Castor oil (less than 0.05) and bubbles of air in PDMS, and highlight the differences that arise in part due to the different boundary conditions for thin film drainage for liquid-liquid versus gas-liquid systems, and in part due to the different Hamaker constants for the two systems.

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