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Spontaneous Capillarity-Driven Droplet Ejection[1] DREW WOLLMAN, Portland State University, TREVOR SNYDER, Xerox, Wilsonville, DONALD PETTIT, NASA Johnson Space Center, MARK WEISLOGEL, Portland State University — The first large length-scale capillary rise experiments were conducted by R. Siegel fifty years ago using a drop tower at NASA LeRC. Siegel was curious if the wetting fluid would expel itself from the end of short capillary tubes in low-gravity. He observed that although the fluid partially left the tubes, it was always pulled back by surface tension, which caused it to remain pinned at the tubes' end. By exploiting tube geometry and fluid properties, we demonstrate that such capillary flows can in fact 'auto-eject' a variety of jets and drops. Multiple and stationary drops, encapsulations, and a wide range of deployed drop diameters are demonstrated using a drop tower (diameters up to ∼10mm). Terrestrial gravity experiments are demonstrated as well as droplets ejected aboard the International Space Station—drops one million times larger than their 1-g counterparts. Scaling arguments reveal the single dimensionless group that best identifies the ejection criteria. The general auto-ejection approach provides a novel mechanism from which to investigate jets, droplets, bubbles, and other large length-scale capillary phenomena.

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