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Drinking in Space: The Capillary Beverage Experiment ANDREW WOLLMAN, MARK WEISLOGEL, Portland State University, RYAN JENSON, IRPI LLC, JOHN GRAF, DONALD PETTIT, SCOTT KELLY, KJELL LINDGREN, NASA Johnson Space Center, KIMIYA YUI, Japan Aerospace Exploration Agency (JAXA) — A selection from as many as 50 different drinks including coffees, teas, and fruit smoothies are consumed daily by astronauts aboard the International Space Station. For practical reasons, the drinks are generally sipped through straws inserted in sealed bags. We present the performance of a special cup designed to allow the drinking operation in much the same manner as on earth, only with the role of gravity replaced by the combined effects of surface tension, wetting, and special container geometry. One can finally ‘smell the coffee.’ Six so-called Space Cups are currently in orbit as part of the Capillary Beverage Experiment which aims to demonstrate specific passive control of poorly wetting aqueous capillary systems through a fun mealtime activity. The mathematical fluid mechanical design process with full numerical simulations is presented alongside experimental results acquired using a drop tower and low-g aircraft before complete characterization aboard the Space Station. Astronaut commentary is both humorous and informative, but the insightful experimental results of the potable space experiment testify to the prospects of new no-moving-parts capillary solutions for certain water-based life support operations aboard spacecraft.

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