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A Study of Critical Wetting Condition of the CFE-Vane Gap Geometry[1] YONGKANG CHEN, RYAN JENSON, MARK WEISLOGEL, Portland State University, STEVEN COLLICOTT, Purdue University — The Capillary Flow Experiment (CFE) Vane Gap experiments follow a line of experiments performed in low-g environments onboard International Space Station to observe critical wetting phenomena in large length scale capillary systems. In a cylindrical container in zero-g, single-valued finite height equilibrium capillary surfaces fail to exist if a critical wetting condition is satisfied. This nonexistence results in significant redistribution of the fluid in the container. The Vane Gap geometry consists of a right cylinder with elliptic cross section and a single central vane that does not contact the container walls. The vane is slightly asymmetric so that two gaps are not of the same size. In this study, we identify the critical wetting conditions of this geometry using the Concus-Finn method for both perfectly and partially wetting fluids as a function of container asymmetry. It will be shown that there are at least three critical geometric wetting conditions that include one for each gap region respectively and one for a global shift of bulk fluid which, among the three, is the most significant.

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