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Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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SELF REWETTING FLUIDS HEAT TRANSFER EXPERIMENT SELENE

Abstract

Liquids whose surface tension increase with temperature are studied in preparation of the "SELF rewetting fluids for thermal ENERGY management" experiment. This SELENE experiment is to be carried on the Thermal Platform facility on the Fluid Science Lab, with thermal control, fluid management and thermal and electrical diagnostics. This paper extends previous works performed for the SELENE experiment exploiting the attractive properties of self-rewetting fluids.

Besides the modeling of the complex processes occurring in the heat-pipe like configuration, the experiment is shaped for understanding of some theoretical aspect that need to be clarified for a tuning of the potential applied set-ups. In particular, a grooved configuration with visualization window is used. In this context, we carried on experimental advances on characterization of the fluid, on optical diagnostics and fine experimental set-up configuration for the definition of the flight cell design. This includes novel optical techniques and novel design of cells developed in our labs. This paper reports these results and describes how the flight results will be processed and which aspects are to improve our understanding of the processes and aid numerical simulations. Possible regimes that can be studied so will be presented, and the novel underlying physical aspects depicted.