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SURFACE ROUGHNESS EFFECTS ON MICROGRAVITY BOILING

Abstract

Nucleate and pool boiling in microgravity presents many challenges due to the lack of gravity driving the bubble departure. This paper continues on a previous presentation which presented an instrument concept to test the heat transfer of materials with varying surface roughness. Previous experiments by others show that in a microgravity environment, buoyancy is not a contributing factor in bubble departure. Surface roughness drives this departure and affects the heat transfer. To better understand the effects of surface roughness on boiling, a device has been designed to test multiple surface materials against a common liquid. The instrument allows for multiple samples to be tested using a common set of instrumentation. The instrument is being developed for a CubeSat platform. This paper presents the terrestrial testing process of the instrument along with the results of these tests. The instrument needs to be integrated to a satellite bus for orbital demonstration and the changes involved in this are outlined. The results of these tests will improve understanding of the physics of boiling in microgravity.