

Experimental results for Titan aerobot thermo-mechanical subsystem development

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This paper describes experimental results from a development program focused in maturing Titan aerobot technology in the areas of mechanical and thermal subsystems. Results from four key activities are described: first, a cryogenic balloon materials development program involving coupon and cylinder tests and culminating in the fabrication and testing of an inflated 4.6 m long prototype blimp at 93 K; second, a combined lab experiment and numerical simulation effort to assess potential problems resulting from radioisotope thermal generator waste heat generation near an inflated blimp; third, an aerial deployment and inflation development program consisting of laboratory and helicopter drop tests on a near full scale (11 m long) prototype blimp; and fourth, a proof of concept experiment demonstrating the viability of using a mechanically steerable high gain antenna on a floating blimp to perform direct to Earth telecommunications from Titan. The paper provides details on all of these successful activities and discusses their impact on the overall effort to produce mature systems technology for future Titan aerobot missions.