Paper ID: 48634
oral
student

46th STUDENT CONFERENCE (E2)
Student Conference - Part 2 (2)

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THERMAL CONDUCTIVITY AND SPECIFIC HEAT MEASUREMENTS OF AN RTV-655/POLYIMIDE AEROGEL COMPOUND AT 77K AND 298K

Abstract

The ability to store cryogenic liquids for long duration space missions is essential to future manned space exploration. Boil-off of cryogens due to incident solar radiation over time leads to pressurization of a cryogenic tank. An ideal tank construction material would have low thermal conductivity and would retain its structural integrity through extreme temperatures. In previous research, a small-scale RTV-655/polyimide aerogel cryogenic liquid storage tank was constructed and tested to assess the performance of the compound material. Further development of RTV-655/polyimide aerogel cryogenic tanks is contingent on performing computational studies to optimize the design and minimize costly experiments. Thermal conductivity and specific heat values of the combination of RTV-655 and polyimide aerogel have not be published at cryogenic temperatures. The Hot Disk Thermal Constants Analyzer in accordance with ISO standard 22007-2:2015 is utilized to measure thermal conductivity, specific heat, and thermal diffusivity values for RTV-655 and polyimide aerogel at cryogenic temperatures.