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THERMAL PERFORMANCE TEST OF VACUUM COMPOSITE INSULATION MATERIAL FOR
CRYOGENIC ROCKET TANK BASED ON CRYOCOOLER

Abstract

Based on the guide bar calorimetric method, a testing platform for the vacuum multilayer insulation material of the liquid hydrogen storage tank was built with the cryocooler as the cold source. The vacuum degree of the testing system was designed as $5\text{e-}4\text{Pa}$. The experiment was carried out in a vacuum tank with a diameter of 1m. The insulation component was wrapped outside the uniform temperature cold cylinder. The outer diameter of the cold cylinder was 146mm and the height was 220mm. The guide bar was connected with the cold cylinder and supported the cold cylinder. The outer diameter of the heat tube is 252mm, and the heat tube can be heated to 400k, which is used to provide the boundary temperature. The apparent thermal conductivity of several multilayer insulation components with different structures in the temperature range of 40k-90k is obtained, which provides support for the design of long-term on orbit storage system of liquid hydrogen.