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GROUND EXPERIMENTAL INVESTIGATION OF THERMODYNAMIC VENT SYSTEM FOR
PROPELLANT ON-ORBIT STORAGE

Abstract

Thermodynamic vent system (TVS) is of significance to long term on-orbit storage of cryogenic fuel. In present study, one ground experiment is established to investigate the pressure control performance of TVS. The simulant fluid HCFC123 is selected to be the experiment fluid and to verify the efficient of TVS in the ground. The tank pressure variation and fluid temperature change are respectively studied in tank self-pressurization, the injection mixing depressurization and active refrigeration process. The refrigeration capacity supplied by the TVS heat exchanger and the thermal stratification during different phases, are specially illustrated. The present experiment proves the effectiveness of the pressure control performance by means of TVS. The total venting gas loss is about 17.3kg for 16 throttling cycles. The corresponding refrigeration capacity of TVS heat exchanger is 1216 1415W, under the circulation volume flow of 95L/h and the throttling ratio of 16.8 18.9