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MARS ENVIRONMENTAL SIMULATION SYSTEM DESIGN WITH PRESSURE-STABLE GASEOUS CO2 ATMOSPHERE

Abstract

A ground environment simulation system with a satisfactory gaseous CO2 atmosphere is designed due to the fact that the traditional thermal vacuum environmental simulation facility can not satisfy the requirements for reproducing the low-pressure and low-temperature atmosphere on the Mars surface. The use of GN2 as the temperature-adjusting medium prevents the moisture condensation on the outer wall of the vacuum chamber, and the combination of a movable pressure control system and a gas charging discharging system keeps the CO2 in a gaseous phase and in a steady pressure against the temperature cycling during the whole simulation test process. The developed system has been applied in a number of ground simulation tests of component products for the Mars explosion missions, to deliver support for the implementation of relevant missions.