SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Services, Missions, Operations and Facilities (2)

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RESEARCH ON MECHANISM OF LAUNCH VEHICLE ELECTROSTATIC CHARGING AND ELECTROSTATIC PROTECTION

Abstract

The new generation of Launch vehicle is facing harsher launch environment with lightning and electrostatic interference. When electrostatic accumulation reaches a certain order of magnitude and produces Electrostatic Discharge, it may result in disastrous consequences to the electrical equipments on rockets. In this paper, considering the actual flight environment conditions, several mechanisms of Electrostatic charging are researched, including triboelectrification between the rocket body and the space particles, engine ejection electrification, induced electrification due to the charged cloud, fracture electrification caused by the raindrops hitting the rocket body, capturing the charged particles in atmosphere, cutting magnetic lines etc. Meanwhile, mechanism of Electrostatic Discharge is analyzed. Furthermore, considering the structural characteristics of the rocket body and grounding system of the electrical equipment, Measures of Launch vehicle Electrostatic Protection are put forward to reduce electromagnetic interference to electrical equipment caused by Electrostatic Discharge. Thereby, the reliability of the Launch vehicle electrical system in the electrostatic environment is improved.

Key Words: Launch vehicle, Mechanism of Electrostatic charging, Electrostatic Protection