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INCORPORATING NATURE OF THE SPACE WEATHER FOR SPACE MISSIONS: PRELIMINARY LUNAR MISSION DESIGN POWERING SPACE RESOURCES UTILIZATION

Abstract

Every neoteric year, an assortment of actors, namely Space Academics, Space Agencies and Companies, are proposing space missions with increasing focus on returning to the Moon for good. The Apollo Missions conducted the Solar Wind Composition Experiment and confirmed that solar wind particles reach the surface of the Moon. Satellite, or spacecraft design engineers simulate solar winds propelling a satellite-on-a-chip to touchdown in the depths of the lunar crater and record the strange effects of the absence of static electricity. A lunar mission design for the use of Chip Satellites to reinforce space resources utilization technologies is presented. A primary focus is on a Cube Satellite hosting Chip Satellites. The goal is to attempt in-flight recording of the amazing auroras, the beautiful lunar surface and bright lunar twilight, to provide excellent evidence of electrostatic levitation of the lunar dust and soil during free flight, and respecting conditions of all the chances of survival of Chip Satellites, to measure the electromagnetic radiation at deep craters, poles, surfaces, and terminator for comparing values with existing data from previous missions. The Satellite, or Spacecraft Design Engineers and the systems engineering team concurrently conducted a series of trade-off studies on various commercial-off-the-shelf components to design a Chip Satellite configuration fulfilling the mission objectives. All the selected components exhibit adequate dimensions and mass for a typical Chip Satellite configuration. The necessary performance is evaluated to complete the mission. Various lunar orbits were analyzed to select a stable trajectory for the Chip Satellites during their operational lifetime. The final design of two different configurations are investigated and each configuration consists of two Chip Satellite models connected via a tether to provide optimal camera pointing and solar power acquisition in the first configuration, and electromagnetic radiation sensing and solar power acquisition in the second configuration.