

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Virtual Presentations - IAF SPACE EXPLORATION SYMPOSIUM (VP)

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DESIGN OF A LUNAR FLYBY MISSION TO STUDY SOLAR WIND DEPOSITS ON THE LUNAR
REGOLITH USING A CUBESAT

Abstract

CubeSats in recent years have become a popular choice for missions operating on a smaller time scale with minimal payload, thus maximising the received scientific data, for the economical value of the mission. The lunar regolith has severe source of clean energy to support the ongoing continuous rise in energy demands around the world. One such element is Helium-3, a light, non-radioactive isotope of Helium with the promise of a new and clean source of energy. But since it's production on Earth is limited to only around 10 kilograms of Helium 3 getting produced every year, it's harvest and usage lacks feasibility. On the other hand, the Moon has been bombarded with large quantities of Helium-3 by the Sun's solar wind for a long time. Current research in the field of nuclear power has proved Helium-3 to be quite a viable fuel for the operation of nuclear fusion reactors for production of clean energy. Previous missions to explore the Moon for its Helium 3 reserves such as the Changé-1, Clementine and Lunar Reconnaissance Orbiter carried heavy payloads which resulted in their increased overall mission cost.

This paper aims to design a low-cost moon probe for a low moon orbit flyby for studying Helium-3 as well as other useful elements embedded within the lunar regolith along with the impact of solar wind on the latter. It will also detail the orbital trajectory analysis in General Mission Analysis Tool (GMAT).