

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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CONCEPTUAL DESIGN OF A LUNAR DUST REMOVING VEHICLE

Abstract

Humankind is going back to the Moon with hopes of building a permanent presence. Yet, dust presence, one of the major issues encountered during the Apollo program has not been properly solved. In particular, the properties of lunar dust will make a permanent human presence a real challenge for space agencies, due to its abrasive nature. In this regard, under the auspices of the Space Generation Advisory Council, as part of the activities of the T.U.R.T.L.E. Research Group of the Space Exploration Project Group, the work described in this paper proposes the conceptual design of a rover equipped with a robotic arm featuring a dual mechanical and electrostatic properties-dependent dust removing system. Besides, commercial-off-the-shelf laser technology would provide support for dust cleaning along with performing surface damage analysis, and providing support for autonomous navigation approaches. Moreover, the work proposes a lunar dust separation study for chlorine oxides production to support astronauts on future deep space missions. At last, the paper also discusses the concepts of operations and end-of-life cycle. It is shown that this concept could also be made beneficial for multiple endeavors, including Martian exploration and terrestrial life conditions improvement, where Earth's equivalent issue, particulate matter, causes serious diseases.