

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

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LUNAR DUSTY EXOSPHERE. IMPLICATIONS FOR THE MOON EXPLORATION.

Abstract

The report is devoted to the consideration of the main problems associated with the formation of the lunar dusty plasma exosphere and the influence of dust particles levitating above the lunar surface on engineering systems of lunar landers and the activities of astronauts at the lunar surface. These phenomena are associated with new previously unexplored and not encountered under terrestrial conditions physical processes involving plasma, charged microparticles of the lunar regolith, electric and local magnetic fields. These complex dusty plasma processes take place in a deep vacuum, which makes the near-surface lunar environment a unique natural physical laboratory. Charged dust particles levitating above the illuminated side of the Moon represent rather “aggressive” factor that affects the engineering systems of landers, the activities of astronauts outside the lander, and human health. Moreover, the degree of negative impact of dust particles on engineering systems and astronauts increases many times during anthropogenic activity at the Lunar surface, compared with dusty plasma processes in natural steady environment. Studies of the physical processes associated with the impacts of dust microparticles on the engineering systems of landers and the activities of astronauts on the lunar surface, as well as methods for mitigation of such impacts, are extremely relevant in anticipation of a new stage of lunar exploration.