

On Possibility of Orbital Polarimetric Survey for a New Lunar Mission

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Telescopic polarimetric observations of the visible hemisphere of the Moon have a long history. Optical polarimetric measurements were used as the remote sensing method to determine number of physical and mechanical properties of the regolith upper layer in different regions of the lunar surface. The objective of the new lunar orbiter could be to determine fine structure of the surface layer, granulometric characteristics, maturity of the soil, and other similar parameters on the micro-level over all lunar surface. The lunar orbiter provided by a polarimetric equipment could carry out the global mapping of the maximum degree and of the minimum degree of polarization, and spectropolarimetric parameters. It is possible to assess effective particle size from the soil albedo and maximum degree of polarization data. Spectropolarimetric ratio of maximum polarization in the blue and red parts of spectrum can serve as maturity parameter as quantitative index of relative content of glasses and glassy particles in the covering lunar material. The preliminary main experiment for the orbiter mission "Lunar Micro" can be global spectropolarimetric and polarimetric survey of the lunar surface with resolution about 100 m to assess the soil maturity, granulometric data, glasses content, and local variations of the data. It is known a positive correlation between soil maturity and concentration of some volatile in fine fraction of regolith, for example, hydrogen and helium-3. The maximum libration in latitude lets us to observe more large lunar polar area in the Earth-light than it is possible in the solar light. So, a special goal of the mission could be study of the polar cold trap relief and surface physical and mechanical properties, and possible lunar ice location in the Earth-light. The principal results of the mission could be used for reconstruction of the impact processes during lunar geological history in the micro-scale.