

Laboratory study on light scattering at small phase angles using a new reflectance spectrometer

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Ground-based observations of the solar system bodies beyond the Earth's orbit are performed at small phase angles, that is, the angle between the Sun and the observer as seen from the object. On the other hand, it is usual that the reflectance spectra are obtained in the laboratory by collecting the reflected light hemispherically by an integration sphere or by observing the sample surface at 30 degree in phase angle. Recent space missions to asteroids and other small bodies have provided bidirectional reflectance data with various angles of incidence, emergence, and phase angle have given impetus to laboratory studies of the reflectance spectra, however, there is little laboratory measurements done at phase angles below a few degree.

We developed a new system specialized for reflectance spectra at small phase angles. The angle of incidence to the surface is nominally 0 degree and the angle of emergence, that is equal to the phase angle in the present system, covers from 0 to 30 degree. The wavelength range is from 950 to 1700 nm. We will present the overview of the spectrometer and the preliminary results on how the reflectance spectra of simulated asteroid surface at small phase angles change with the angle conditions.