

# Laboratory study of opposition surge of rock chips and particle layers

T. Honda(1), A. M. Nakamura(1), T. Mukai(1)

(1) Graduate School of Science and Technology, Kobe University, Kobe, Japan  
(honchan@kobe-u.ac.jp/ Fax: +81-78-803-6483)

Surfaces of small bodies such as asteroids are covered with regolith particles. The intensity of the scattered light from such surface nonlinearly increases at small solar phase angles, the angle between the light source and the detector as seen from the target. The degree and the sharpness of the phenomena, opposition surge, are considered to depend on the physical state of the surface.

It was shown the opposition surge appears on scattered light from surface of rocks (Shepard and Arvidson 1999). However, it remains to be incompletely understood how the opposition surge varies with the structure and optical characteristics of the scattering target.

First, we performed measurements of scattered light from rock chips and particle layers at low phase angles. Measurements were performed using a multi phase angle near infrared spectrometer at Kobe University with the incident angle fixed at 2 degree and the phase angle varied within 0-25 degrees. A clear differences were found between the phase curves of dunite chip and particles, whereas there were no apparent difference between the chips and the powders for a meteorite and mortar.

We then performed new measurements to focus on clarifying whether or not (1) bulk chips consisting of uniform composition also show opposition surge (2) difference in size of the constituent grains of bulk chips affects the opposition surge, and (3) difference in surface roughness of bulk chips has dominant effect. We will show the results of several types of bulk chips and sintered powders, and will discuss on the possible factors that can make difference in opposition surge.