

Auto-Focus system of Multi-Band Camera (Engineering Model) on SLIM

*Yusuke Nakauchi¹, Hiroyuki Sato¹, Hiroshi Nagaoka¹, Kazuto Saiki², Makiko Ohtake³, Hiroaki Shiraishi¹, Chikatoshi Honda³, Yoshiaki Ishihara¹

1. Japan Aerospace Exploration Agency, 2. Osaka University, 3. The University of Aizu

Smart Lander for Investigating Moon (SLIM) project will demonstrate a “pin-point” landing within a radius of 100 m on the lunar surface. It will be launched in FY2022. The SLIM aims “SHIOLI” crater (13.3° S, 25.2° E) to derive the detailed mineralogy of the olivine-rich exposures to investigate the composition of the lunar mantle or deep crustal material, and understand their origin. The Multi Band Camera (MBC) is the scientific instrument on board SLIM lander to obtain Mg# (= molar Mg / (Mg + Fe)) of lunar mantle materials. The MBC is composed of a Vis-InGaAs imaging sensor, a filter-wheel with 10 band-pass filters, a movable mirror for panning and tilting, and an autofocus system.

The MBC observes the boulders and regolith distributed around the lander. Since various distances to the objects are expected from a few meters to infinity, the MBC is equipped with an auto-focus (AF) system. The MBC uses the jpeg compression technique. An image with maximum sharpness taken in a best focus position will have the largest image file size after JPEG compression. Using this characteristic, the AF algorithm is designed to automatically find the focus lens position that maximizes the image file size after jpeg compression. Our AF system has been tested using the Engineering Model of MBC (MBC-EM). The imaging target is a picture of lunar surface obtained by previous spacecrafts and basaltic rocks from Hawaii. Our results suggest that the amount of initial movement is important parameter. In the presentation, we will show the results of AF system, and MBC operation plan.

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