

Development of the telescope for ILOM (In-site Lunar Orientation Measurement) using the DOE (Diffractive Optical Element)

Shingo Kashima^{1*}, Hideo Hanada¹, Hiroshi Araki¹, Seiitsu Tsuruta¹

¹RISE Project, NAOJ

ILOM demands the very high performance to the optical system in order to realize the determination of star positions with 1 milli arc second accuracy on the Moon whose environmental condition is very fierce. There are several causes that degrade the optical performance and the most effective cause is the change of the environmental temperature. The temperature change causes the change of lens shape and the change of the refractive index of each lens material and the later is much dominant. The optical system of ILOM is the refractive system so we have to reduce the chromatic aberration using so-called the low dispersion glass, but this type glass has a much bigger dn/dt (the index change for the temperature change) than the normal glasses. In result of this, the optical system using the low dispersion glass lens becomes very sensitive to the change of the environmental temperature.

So we developed the optical system (objective lens) using the DOE (Diffractive Optical Element). Using the DOE, we can reduce the chromatic aberration without the low dispersion glass lens. So we can develop the objective lens that is very tolerant to the environmental temperature change because we can design the objective lens using small dn/dt glass lens only.

Keywords: ILOM, DOE