Thermal analysis of the celestial observation telescope on the Moon

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RISE(Reseach in SElenodesy) group in the National Astronomical Observatory is proposing a celestial observation on the Moon as a next lunar mission which will follow the SELENE mission (ILOM ; In-situ Lunar Orientation Measuement). The aim of this telescope is to observe the lunar rotation directly on the polar region of the Moon by measuring the trajectories of the stars up to 13 magnitudes. It will provide information about the lunar inner structure by detecting the physical libration which is hard to detect from the ground-based observations such as the Lunar Laser Ranging (LLR). The amplitude of the physical libration and the precession are considered to be 1.8 arc second and 0.02 arc second, respectively. The needed accuracy for the observation by the ILOM is 0.001 arc second (1mas), which is one order smaller than that of the LLR measurement. This amounts to the one thousands of a pixel size of the CCD array and the high-spec hardware design which can suppress the extension of the tube by the solar light should be crucial. We report the results of the thrmal analysis of this telescope on the Moon.