Performance Aspects of the Next Generation Lunar Retroreflector

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The ability of the Next Generation Retroreflector (NGR) (a.k.a. The Lunar Laser Ranging Array Retroreflector for the 21st Century and/or MoonLIGHT) depends heavily upon a detailed thermal simulation to assure that the NGR will perform according to the requirements of the nominal design. This performance objective is to assure 80% of the peak return at all times during a lunation (assuming the NGR is pointed correctly at the earth). There are three phases in addressing this issue: Phase 1 consists of using a rigorous Solar/Orbital/Optical/ Thermal/Optical (SOOTO) simulation. This has been described briefly in earlier presentations. The SOOTO is used to evaluate the effects of the reflectivity, emissivity and conductivity of various elements of the NGR, to allow the selection (where feasible) of these parameter to obtain the design performance. Phase 1 will be the primary focus of this talk, illustrating some initially surprising results. Phase 2 addresses the effects of angular offsets of the back faces of the CCR and the effects of the phase shifts due to Total Internal Reflection. This allows the optimization of the angular offsets of the back faces of the CCR and the orientation of the CCR. Phase 3 consists of incorporating the Phase 2 results and re-evaluating the effect of the parameters studied and selected in Phase 1. Further, several other topics will be briefly reviewed: The new design to address the second landing site, the effects of break-through in solid CCRs, detailed simulations of the effects of atmospheric propagation and the testing of a candidate for a low visible absorption high thermal infrared emissivity coating.

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