TherMoS - A concept for a dynamic thermal modeling approach for celestial body surface operations

Abstract:
In this paper the case is made for the necessity of a dynamic thermal tool for surface operations called the Thermal Moon Simulation (TherMoS). Lunar surface temperature models are compared and established thermal softwares are discussed. The major shortcomings of these existing models and software tools, with regard to celestial body surface operations (with a focus on the Moon), are pointed out. Thermal issues of surface units such as extravehicular activity (EVA) suits and rovers are highlighted. Due to their mobility, both may have dynamic thermal interactions with their environment (e.g. craters, mountain ranges, boulders and surface base structures) and a fast changing orientation with respect to the sun, whilst inner thermal loads are not constant. Two cases are discussed examining the necessity of dynamic thermal simulations in contrast to the common min/max approach. The TherMoS tool outline, concluding the paper, is an approach to address this emerging demand.

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