

IAF SPACE POWER SYMPOSIUM (C3)  
Space Power System for Ambitious Missions (4)

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AN EFFICIENT POWER MODELING APPROACH FOR THE EMIRATES LUNAR MISSION

**Abstract**

Today, solar power systems are the main sources of energy used by lunar rovers. This technology has proven to be robust, reliable and space proven. However, the design of a power system for lunar rovers requires taking into consideration different environmental aspects. Due to the limited amount of resources available to small rovers, creating better resource management models becomes essential in future mission planning and rover design.

A complete power model constitutes of three fundamental elements; consumption, generation and storage. In this work, we propose a complete power budget model that includes all those elements for the Rashid lunar rover, part of the Emirates Lunar Mission (ELM). Firstly, this particular model includes the power consumption of each subsystem at any given rover operation. Each operation is determined during the mission planning stage, and in order to meet mission objectives, the rover needs to execute multiple operations sequentially. Therefore, with the large number of possible operation combinations the number of different scenarios also increases, hence the importance of a scalable model. The second aspect of the model presents a power generation profile. This is mainly dependent on the rover's trajectory, time of the day, and solar panel orientation. The energy stored (for example, in a battery) can also be predetermined while tracking power generation and consumption. This proposed power budget model can be considered as a powerful tool for future lunar missions.