

Low-mass, Efficient Power Systems for Lunar and Planetary Surface Packages

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Abstract:

Space applications require robust and secure electrically powered hardware to complete missions. Energy storage technologies utilizing chemical battery technology have low efficiency and low tolerance to space environments. Mechanical Batteries also known as flywheel energy storage devices have been long known as a possible solution to these issues. The advent of advanced hybrid composite materials capable of large static stresses has caused a resurgence of interest in mechanical energy storage. Our concept of a high efficiency proprietary iron-less motor/generator integrated with novel magnetic bearings and composite flywheels enables large increases in energy density and decreases in cost. In addition, a connected mesh of systems enables robust power delivery in hostile environments. A major application of this technology is robust energy storage on the lunar surface. This system enables missions to send small energy storage units in multiple launches that could be linked on-site and have mechanical lifetimes exceeding 20 years. This system would be designed to fit the needs and requirements of the particular mission.