

IAF SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies and Application (2)Author: Mr. Herbert Murray
United States

WIRELESS POWER SYSTEM APPROACHES FOR PLANETARY ROVER EXPLORATION

Abstract

Truly meaningful space exploration arguably involves visiting another planet or moon within our solar system. Lighthouse presents a conceptual wireless power transmission system that is optimal for planetary exploration. The system involves a base station that collects solar energy and converts the energy into optical laser-based energy that can be beamed to a scouting rover. The rover incorporates many novel advancements that have been developed by Lighthouse, including efficient laser receiver technology for conversion of laser energy into either electrical energy or heat energy. Heat energy has the benefit of higher efficiency overall for driving a mechanical system such as the drivetrain of a rover via a Stirling engine. Lighthouse has developed designs for thermal batteries that could permit unprecedented rover travel distances as well as permit vital exploratory rover operations such drilling, sample analysis, cargo carrying, and other similar mechanical operations. In addition, lightweight electrical battery designs combined with highly efficient optical-to-electrical power conversion at a variety of wavelengths (not limited to silicon) have been not only designed but already field demonstrated by our team, including communications relays with the base station that use zero power at the rover. We present the ways in which these technologies can benefit a planetary exploratory rover scenario.