Abstract

This paper examines the feasibility of a multi-kilowatt wireless radio frequency (RF) power system to transfer power between lunar base facilities. The analyses show that wireless power transfer (WPT) systems can be more efficient and less expensive than traditional wired approaches for certain lunar and terrestrial applications. We already have the available technology necessary to make large solar arrays on the moon, and then use wireless power
transmission via microwaves to send the resulting electricity back to earth. Although the upfront cost would be high, it wouldn't be impossible. The study includes evaluations of the fundamental limitations of lunar WPT systems, the interrelationships of possible operational parameters, and a baseline design approach for a notional system that could be used in the near future to power remote facilities at a lunar base. Our notional system includes state-of-the-art photovoltaic (PVs), high-efficiency microwave transmitters, low-mass large-aperture high-power transmit antennas, high-efficiency large-area rectenna receiving arrays, and reconfigurable DC combining circuitry.

References


Index Terms

Computer Science  Engineering and Technology

Keywords

Photovoltaic  Rectenna  Microwave transmitter  Rectenna array  stretched lens array  Load station