

1. Session Title

Challenges and Opportunities for Lunar Surface Microgrids

2. Abstract

Lunar microgrid is one of the most exciting new frontiers for power electronics. Mobile and stationary dc microgrids for rovers, charging stations, science experiment stations, habitats, and in-situ research utilization all require a new generation of power converters, circuit breakers, as well as associated control, protection, and reconfiguration strategies. Though there has been abundant research and development of terrestrial dc and ac microgrids, lunar microgrids present a new set of challenges and opportunities because of extreme operation conditions, unique load and source combinations, the need for ultra-high power density and high efficiency, stringent requirements on resiliency and survivability, etc. Thus, with experts from NASA, industry and academia, the proposed special session is aiming to provide an overview of power electronics related challenges and potential approaches for lunar microgrids.

3. Session Organizers

Organizer 1: Dr. Jin Wang, Professor, The Ohio State University



Dr. Jin Wang (IEEE Fellow) is a Full Professor at The Ohio State University. Dr. Wang has over 200 peer-reviewed journal and conference publications and 9 patents. His research interests include wide bandgap power devices and their applications, high-voltage and high-power converter/inverters, electrification of transportation and integration of renewable energy sources. Dr. Wang initiated and served as the General Chair for the 1st IEEE Workshop on Wide Bandgap Power Devices and Applications in 2013. Currently, Dr. Wang serves as the Chair for the Technical Committee on Aerospace Power at the IEEE Power Electronics Society and an Associate Editor for IEEE Transactions on Power Electronics and IEEE Journal of Emerging and Selected Topics in Power Electronics (J-ESTPE). Since 2021, Dr. Wang has been leading a NASA sponsored project on flexible dc energy routers for lunar microgrids as a part of NASA's Lunar Surface Technology Research program.

4. Session Panelists/Speakers

Panelist 1: Jeffrey Csank, Electrical Engineer, NASA Glenn Research Center

Title: The Challenge for DC Microgrids on the Lunar Surface

Panelist 2: Josep M. Guerrero, Professor, Aalborg University

Title: Electrical and Biological Space Microgrids for Future Lunar Bases

Panelist 3: Dr. Michael Futrell, Senior Principal Engineer, Collins Aerospace

Title: Integration of DC Energy Router in a Lunar based Power Distribution System

Panelist 4: Parag Kshirsagar, Discipline Lead, Raytheon Technologies Research Center

Title: Opportunities and Challenges in Space Power Electronics

Panelist 5: Jin Wang, The Ohio State University

Title: Challenges for Power Electronics in Lunar Applications