High-Power Plasma Propulsion at NASA-MSFC

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Abstract

During the last 15 years, electric space propulsion has seen a significant increase in use on a number of satellites and deep-space probes. While lower-power thrusters have been maturing from research to development and flight applications, focus has shifted to research on propulsion systems that could be used for higher-power interplanetary science, cargo, and manned missions. This seminar will highlight the work at NASA’s Marshall Space Flight Center (MSFC) focusing on research and development of a variant of thruster known as the pulsed inductive thruster (PIT). This effort is aimed at reducing the risks associated with PIT technologies needed for deep-space missions. Included in this are demonstrations of repetition-rate operation and the use of alternative propellants, such as hydrocarbons and water, which are potentially prevalent at a destination and could be used for refueling the propulsion system. In addition, the MSFC efforts to use solid-state high-power electrical switching and fast gas valve technologies in the present work are critical to the eventual life qualification and application of pulsed thrusters on long-duration missions.

Dr. Kurt Polzin is the project leader for electric propulsion research and development at NASA’s George C. Marshall Space Flight Center. Dr. Polzin has been with NASA since 2004 as a propulsion research scientist at the Propulsion Research and Development Laboratory. Kurt has received awards from the Agency for his work in high-power plasma propulsion and in-space nuclear technologies. He earned a bachelor’s degree in aeronautical and astronautical engineering from The Ohio State University in 1999 and completed his Ph.D. in mechanical and aerospace engineering at Princeton University in 2006, where he was a National Defense Science and Engineering Graduate Fellow. Dr. Polzin has published numerous papers in technical journals and conference proceedings in the areas of pulsed-plasma propulsion, thruster performance evaluation, and flow components for liquid metal-fed thrusters and liquid-metal-cooled in-space nuclear reactor systems. Dr. Polzin is a Senior Member of the Institute for Electrical and Electronics Engineers (IEEE) and the American Institute of Aeronautics and Astronautics (AIAA) and is currently serves as a member of the AIAA Electric Propulsion Technical Committee.