



Wednesday
November 30, 2022
3:30 pm
Room 1005 Dow

Dr. Kurt Polzin

NASA-George C. Marshall Space Flight Center **Critical Developmental Challenges and Potential Advancement Paths for Megawatt-Scale Nuclear Electric Propulsion Systems**

Megawatt-class nuclear electric propulsion (NEP) systems for human missions require the development and maturation of a range of technologies. Many of the critical subsystems are relatively immature and present significant technological challenges when considering the requirements that must be met to realize a feasible spacecraft design. A large challenge for any nuclear system, but especially for one at the megawatt scale, is the capability to perform ground testing at relevant scales and power levels to mature each subsystem. These tests must also support modeling and simulation activities to demonstrate understanding of the important and controlling physical phenomena in the system and to aid in the prediction of lifetime capability for a full-duration mission. NASA's Space Nuclear Propulsion project is pursuing a strategy that uses a building-block approach, maturing technologies for a 1 MW_e block under the assumption that a future high-power NEP mission will have requirements that can be met either through straightforward scaling of this building block to the levels required or using multiple blocks to meet the overall power needs. This seminar will discuss the challenges of developing an in-space MW_e-scale nuclear power source and an accompanying very large plasma propulsion system and present some potential advancement paths to pursue in this endeavor.

About the Speaker: Dr. Kurt Polzin is Chief Engineer for Space Nuclear Propulsion at NASA's George C. Marshall Space Flight Center (MSFC) in Huntsville, AL. He received his B.S. in Aeronautical and Astronautical Engr. from The Ohio State University in 1999 and his Ph.D. in Mechanical and Aerospace Engr. from Princeton University in 2006. Dr. Polzin joined the Propulsion Research and Development Lab. at NASA-MSFC in 2004 as a propulsion research engineer. Prior, he was the Space Systems Team lead for the Advanced Concepts Office performing conceptual spacecraft system and mission design and analysis. He is also an adjunct faculty member at the University of Alabama in Huntsville where he has taught in Physics and Mechanical & Aerospace Engr. He has co-authored over 100 technical publications on the testing and modeling of electric and space nuclear propulsion systems and components and is lead author of the monograph *Circuit Modeling of Inductively-Coupled Pulsed Accelerators*. Dr. Polzin is a Senior Member of the Institute for Electrical and Electronics Engineers (IEEE) and an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA), in which he also serves on the Electric Propulsion Technical Committee and as the Southeastern US Regional Director.