NEP Mission Performance Technology Drivers

Ira Katz, Robert Frisbee, Muriel Noca, John R. Brophy
Jet Propulsion Laboratory

Gary Langford
Marshall Space Fight Center

Nuclear electric propulsion offers enhanced science return for missions to the outer planets and beyond. However, building a 100kWe NEP powered spacecraft using today's state-of-the art components and subsystems may result in undesirably long trip times. In this talk we address the impact on trip times of technological improvements and increased power levels in the power generation/ power conversion system and in the electric propulsion system. For the electric propulsion system, the analysis is taken to the subsystem level, addressing the impact on trip time of improvements in discharge chamber, grid, neutralizer, power processing, propellant management, and propellant tank technologies. This study identifies the specific technology developments that enable trips times for a Neptune/Triton orbiter of less than 10 years with a high power NEP spacecraft employing very efficient electric propulsion. Due to the size of the radiator, fitting the spacecraft within an existing launch vehicle shroud was identified the chief constraint to going to very high powers.