Paper ID: 71998
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IAF SPACE POWER SYMPOSIUM (C3)
Interactive Presentations - IAF SPACE POWER SYMPOSIUM (IPB)

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ADVANCED STIRLING RADIOACTIVE GENERATOR

Abstract

The advanced Stirling radioisotope generator (ASRG) is being developed for multi-mission applications to provide a high-efficiency power source alternative to radioisotope thermoelectric generators (RTGs). The ASRG efficiency could reach 28 to 32 percent, which results in reducing the required amount of radioisotope by roughly a factor of 4 compared to RTGs. Thus, because of the limited supply of Pu-238, utilization of the ASRG can extend radioisotope power available for future space science missions, such as deep-space missions, large planetary surface rovers, and systems in support of human exploration activities. This paper describes a concept to demonstrate the operation of an advanced power supply (known as ASRG) in space for an extended period of time as a hosted payload. The demonstration unit will check the highest risk technologies associated with the Advanced Stirling Radioisotope Generator (ASRG) design while eliminating the complexities associated with the already demonstrated General Purpose Heat Source (GPHS) by using electrical power from the host to drive heaters in place of the GPHS. The primary goal of this demonstration is to verify the system performance of these new technologies in the space environment for an extended period of time. A secondary goal is to operate through the launch environment. These goals could be accomplished aboard a host intergalactic space vehicle or the International Space Station (ISS) as long as electrical power is available to the electric heat source. This paper also discusses the accommodation considerations for interfacing the demonstration unit on a host satellite. The overarching objective is to provide additional confidence in the suitability of the ASRG for use in deep space missions.