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ADVANCED STIRLING RADIOACTIVE GENERATOR- THE FUTURISTIC POWER GENERATOR

Abstract

Sustainable power supply is an important factor to be considered while planning long space journeys. The paper proposes a novel method to achieve sustainable power supply. The proposed Advanced Stirling Radioisotope Generator (ASRG) aims to be used for multi-mission applications. ASRG will provide a high-efficiency power source alternative to the existing radioisotope thermoelectric generators (RTGs). The working efficiency of ASRG could reach 28 to 32 percent.This also reduces the required amount of radioisotope by roughly a factor of 4 compared to RTGs. Due to the limited supply of Pu-238, optimum utilization is thus required. The ASRG aims to extend power extraction from the radioisotope to ensure and enhance future space missions, such as deep-space missions, large planetary surface rovers, and systems to support human exploration activities. This paper describes a conceptual methodology to operate this advanced power supply generator in space to be used for an extended period of time as a hosted payload. The proposed 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 ASRG is to verify the systems' performance of these new technologies in the space environment for an extended period of time. A secondary goal is to make ASRG autonomous throughout the launch environment. The ASRG also aims to be used in International Space Station (ISS) to generate required power. The paper also discusses the accommodation considerations for interfacing the ASRG on an inter-planetary satellite. The overarching objective is to provide additional reliability in the use of the ASRG for deep space missions.