IAF SPACE POWER SYMPOSIUM (C3)
Interactive Presentations - IAF SPACE POWER SYMPOSIUM (IP)

Author: Mr. Surya Vaibhav DVR
BMS College of Engineering, Bengaluru, India, dvrsurya37@gmail.com

Mr. Priyanshu M
BMS College of Engineering, Bengaluru, India, priyanshuj37@gmail.com
Mr. Sushir Subramani
India, sushir.s23@gmail.com
Ms. Varsha Udupa
BMS College of Engineering, Bengaluru, India, varsha.ee18@gmail.com
Dr. M N Suma
India, suma.ece@bmsce.ac.in

FEASIBILITY ANALYSIS OF INTEGRATING THERMO-ELECTRIC GENERATORS TO SPACECRAFT SOLAR PANELS

Abstract

Solar panels are an essential component of any spacecraft, as they provide the necessary power to keep it operational. However, the efficiency of space-grade solar cells decreases with time, resulting in degradation and decrease in total power generated. This is primarily due to the high temperature difference (ΔT) experienced by the solar panels in orbit. To counter this issue, the proposed work focuses on integrating Thermo-electric generators (TEGs) with existing conventional spacecraft solar panels in order to enhance the overall power output. TEGs are solid-state devices that convert the temperature difference into electrical energy. This is accomplished by creating a potential difference between the p-n junctions of the TEG when subjected to a temperature difference, as per the Seebeck effect. This study provides a comprehensive analysis of the feasibility of integrating TEG Systems with spacecraft solar panels, covering the model design methodology, experimental testing, potential benefits, and technical challenges. The proposed approach aims to substantially enhance power output, leading to longer mission durations and increased scientific research opportunities. The proof of concept model developed and analyzed in this study demonstrates the potential for significant improvements in spacecraft power generation.