Abstract

This paper presents an optimum design of a photovoltaic (PV) power system for the satellite market using high efficiency solar cells. This is to enhance the power capabilities of the satellite solar arrays without extra challenges in area, weight and budget constraints. In this way, the designed power system can efficiently fulfill the power requirements of the satellite subsystems, either in daylight or eclipse periods. In this paper, the presented design is applied on GEO satellites, for which the solar arrays use triple junction cells technology. The required area and mass of the solar array are calculated. This is in addition to estimating the required number of assembled cells in the designed solar array. The optimum size of the satellite batteries, used in eclipse periods, is also determined. Finally, an economic analysis is performed to demonstrate the financial budget of the satellite project.

References
9. 30.7% Triple Junction Space Grade Solar Cell spectrolab XTJ prime triple junction solar cell.pdf.
11. Saft-space “Saft batteries... powering outer space for 50 years: extreme performance batteries meeting the demands of space applications”, www.saftbatteries .com
15. 1st Symposium on Space Educational Activities, December 9-12, 2015, Padova, Italy.

**Index Terms**

Computer Science | Power Systems

**Keywords**

Multijunction Solar cell, GEO, Satellite Orbit, Batteries, Design PV, Efficiency, Economics.