

SPACE POWER SYMPOSIUM (C3)
Small and Very Small Advanced Space Power Systems (4)

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EFFECT OF ORBITAL PARAMETERS AND FLEXIBLE PANEL CONFIGURATIONS ON POWER
SYSTEM IN TWIN NANO-SATELLITE

Abstract

STUDSAT - 2 (STUDent SATellite) are twin nano satellites each weighing about 5.5 Kg in mass and with dimensions 30*30*15cm which aims to prove Inter-Satellite Communication between STUDSAT 2A and STUDSAT 2B, implementation of drag sail for demonstration of de-orbiting mechanism and experimentation of deployable solar panels to maximize power generation. The Electrical Power System is one of the most integral parts of any satellite. The polar sun-synchronous orbit with 98 inclination is chosen; as most of the cubesats are launched in lower earth orbit, the power generation at various altitudes is estimated. Variation in altitude leads to corresponding alteration in time duration of one complete orbit and their velocity. The solar arrays are mounted on both the surface of the deployable panel which helps to generate power from direct sun rays and also from albedo rays of the earth. A novel method of MPP tracking is presented which involves the measurement of the panel voltage, panel temperature and computing the sun incidence angle with the knowledge of the cubesat position. The work on panel deployment significantly increase power capacity of the nano satellite. Sizing the solar panel involves the calculation to determine the number and circuit configuration of the chosen solar cells that have to be inter connected to meet the power requirements. This helps in optimizing the solar panel design. The autonomy built into nano satellites for orbital manoeuvres and attitude control with the help of modern sensors and actuators ensures that minimal ground support is required for their functioning. Their designed life time varies from six months to two years. Considering the many present and future applications of nano-satellites and the fact that lot of efforts are being put to miniaturize different sub systems of nano satellites, a need was felt to increase the power density of the power subsystem also. This proved to be the motivation for the work described in this paper.