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

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INNOVATIVE POWER GENERATION METHODS FOR NANO-SATELLITES USING THE ATTITUDE DETERMINATION AND CONTROL SYSTEM

Abstract

The dawn of the space age began with the launch of Sputnik in 1957. Development over the years has yielded the capability for mankind to send thousands of miniature, modular satellites into orbit every year. The advances in technology have led to the construction and use of highly efficient components in the subsystems of the new satellites. While the missions are planned every inch of the way, there may be certain unforeseeable circumstances which may arise during the mission time and pose catastrophic threat to the mission. One of the most essential subsystems on board the satellite is the power generation subsystem. In case of emergencies, we sometimes have to make the satellite perform obit degrading maneuvers which help generate electric power using the interaction between the magnetic coils and the Earth's geomagnetic field. We now aim at on - board power generation using attitude control systems such as Momentum Wheels without a degradation of orbital altitude. The basic principles of an electric generator will be exploited in order to charge the batteries being discharged, since experiments have shown that certain Li-Po batteries can be simultaneously charged and discharged. Also, we may use highly efficient thermocouples for the power generation since there is considerable temperature difference between the surroundings of the satellite and its interior environment. Such novel methods of on board power generation without much increase in the overall weight of the satellite shall prove to be the harbingers of a new era of long term space missions and research.