SPACE POWER SYMPOSIUM (C3)
Architectures, concepts and systems for space power (3)

Author: Mrs. Na young Lee
Korea, Republic of, nylee@kari.re.kr

Mr. Day-Young Kim
Korea Aerospace Research Institute (KARI), Korea, Republic of, dykim@kari.re.kr
Mr. Moon-Jin Jeon
Korea Aerospace Research Institute (KARI), Korea, Republic of, mjjeon@kari.re.kr

POWER SYSTEM ARCHITECTURE AND BATTERY DOD TREND ANALYSIS OF LEO SATELLITE

Abstract

The power for the low-earth orbiting satellite operation is provided by the output current of the solar array and the battery current. Solar arrays can be directly toward the sun using the control algorithm of the solar array drive motor. In case that there is no control motor for a solar array, the output current from the solar array is changed by the incidence angle of the sun light which varies according the satellite position change. The solar array output current is very important for the satellite power analysis to predict the required power for some satellite operation cases because it is used for the satellite operation and for charging the battery. A battery for the satellite operation power has the depth of discharge requirement for its safe condition so it is important to check whether the battery discharge current trend satisfies the requirement considering some satellite operation cases. The power system of Korean low-earth orbiting (LEO) satellites has three set of solar arrays without the solar array control motor and one Li-Ion type battery package as a power source. During the safe-hold mode especially the launch phase and the separation phase, only the battery generates required power to the LEO satellite until the solar array deployed. The operating limitation of the battery is the battery depth of discharge (DOD). For the safe operation for the Li-Ion battery, the power requirement at the launch phase and separation phase should be assumed. In this paper it is described the studying of the data used for a low-earth orbiting satellite power analysis and prediction for some satellite operation and the examination method for the battery DOD trend analysis especially for the launch phase and separation phase.