

SPACE POWER SYMPOSIUM (C3)
Advanced Space Power Technologies and Concepts (3)

Author: Mrs. Liu Yiwei
China, liuyiwei_21at@163.com

Mr. Peng Jian
China, pengjian@163.com

Mr. Liu Yuanmo
China, liuyuanmo@163.com

Ms. Yan Wanjuan
China, Yanwanjuan@163.com

Mr. Zhao zhiming
China, zhaozm@163.com

Dr. Shengsheng Yang
Lanzhou Institute of Physics, China, yangss510@hotmail.com

Mr. Lv Chen
China, lvchen@163.com

Dr. Zhi Yang
DFH Satellite Co. Ltd., China, young_zhi@163.com

THE LIFE PREDETERMINATION FOR LEO SATELLITE POWER SUPPLY SYSTEM IN- ORBIT
EXPERIMENT

Abstract

Abstract: The LEO satellite is frequently passing in and out sun shadow. The sun incidence angle is large range of variation during a year. The power output of cell array is declined as time in the condition of complex space environment. Recharging times of the battery in orbit are more and more. So power supply system is an important damage factor of the LEO satellite. The paper shows that the researching and experiment works are carried on which the technology difficulties for life-determination and life-extend are solved for LEO satellite. The basic theory and testing method are achieved such as information fuse, performance degradation evaluation and detecting insignificant degradation signal etc. The paper synthetically analyzes key effecting factors of the power supply working life of LEO satellite under the couple effect of space environment condition. In view of the evaluation method about radiation displacement damage, the degradation parameter model of cell array is built in according to I-V curve equation under the condition of the space complex environment. The MPNN and self-adaption forecast method is used to research the life predetermination methods for battery based on imperfect experiment data. The life modal of power supply controller is built also. The life modal for power supply system of LEO satellite is built in according with energy balance principle. The life predetermination arithmetic and software platform for LEO satellite power supply system are built. The life predetermination result of six satellites such as H-J-1A H-J-1B in-orbit experiment is reached 90 percent credibility accuracy compared with real life data curve of in-orbit small satellite. The surplus life of LEO satellite power supply can be supplied for a reference basis.

key words: LEO Satellite, Power Supply System, Life Predetermination