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THE NEW APPLICATION OF SUPERCAPACITORS IN POWER SYSTEM FOR CUBSATS.

Abstract

As we all know, power supply is vital for CubeSats. Normally, the CubeSats use li-ion battery pack for its power system. However, the life time of the li-ion battery is always the barrier for the development of CubeSats. In this paper I am trying to build a safer, longer life-time and more stable battery pack for CubeSats. This paper describes the validation of the performance, the power management system and the actual data of the supercapacitors. Through many kinds of experiments on supercapacitor pack, such as charging and discharging test, environmental experiment and simulation, we study on the performance of supercapacitor. Based on the power management system we designed for the supercapacitors, we study on the application of the supercapacitors. Through the analysis of the performance, structure and data, we found supercapacitor can be the power system in CubeSats and behave better. Firstly, the life time is more than 10,000 cycles, and the li-ion battery is only 300 cycles. Secondly, discharge curve in low temperature is better than li-ion battery. Thirdly, the energy density is 95 Wh/Kg which is enough for the CubeSats. Fourthly, the maximum current is more than 20A which helps the power management system to be safe and efficiency. Although, the supercapacitor is used in vehicles and some industry fields, it is still not engaged into the power system on CubeSats. This technology will be firstly verified on our satellite, TY-4 in this mid of the year. The impacts of using supercapacitors in CubeSats are not only having more time on mission, but also the cost of the CubeSat industry.