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DESIGN AND CONTROL OF ELECTRICAL POWER SUBSYSTEM FOR CUBESAT APPLICATIONS

Abstract

Since the last decade, the launch of small satellites (also known as CubeSats) has been exponentially increasing in industry and academia. A reliable and sustained operation of any satellite whether it is small as a CubeSat or large as the International Space Station (ISS) is ensured by a reliable Electrical Power Subsystem (EPS). The EPS of a satellite mainly consists of the prime power source supplying main power, energy storage element providing power during eclipse periods, power conditioning unit and a power distribution unit. Since the space environment is limited by some constraints, the EPS shall be designed carefully to sustain such an environment. In this paper, the EPS of Masdar-YahSat first satellite (MySat-1), a 1 U CubeSat developed at Khalifa University of Science and Technology aimed to take images of earth as a primary mission is modeled in MATLAB/Simulink. The EPS dynamics are studied during the transition of different operational modes of CubeSat. Moreover, a new proposed model of EPS is presented and compared to the existing model in terms of reliability and system losses.