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

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SOLAR SIMULATOR FOR NANOSATELLITES

Abstract

The evolution of technology has made the satellites a complex piece of technology and in less than fifty years the space area has achieved one of the fastest advances in human history, and as well as the time advance the development of the space technology will do it but every time more faster, in the field of satellites the mission every time need to be precise and without mistakes. That means that the preparation of the satellite in earth need to be carefully and with all the necessary tests, to have a successful mission, all the subsystem of the satellite need to be tested and have the best performance in all situations during the mission, it is the reason because the stage of simulation is very important, in the power subsystem nowadays frequently satellites in missions near the sun, use solar panels as source power because they are a renewable power source and it make it a good option for long mission. The design of solar simulator is a very useful tool because they can give us an estimate of the performance of each solar panel that we will ship to the space, to supply the energy for the satellite, and that makes that power subsystem be more reliable. This simulator it is different to currently simulators, because the test plane are not fixed, it has two grades of freedom to simulate the motion during the track, with respect to the Sun. This can be done because it has two motors to move each axis, to move the height we use a DC motor and in the other hand we have the axis to control the angle with a stepper motor, with this two movements we can change the solar irradiance as well in space. The Simulator control is achieved with a microcontroller, connected to a power stage designed with relays, and a Darlington configuration with transistor to have enough voltage to control the power source with the microcontroller that move both motors.

Other important part of the solar simulator is to measure the performance of the solar panels this is possible because it has sensors to measure important parameters for us, like voltage, current, temperature and solar irradiance and with this values we can create a data base to have graphics to visualize the behavior during the test, and also to characterize each solar panel.