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INVESTIGATION OF THE TEMPERATURE CYCLES OF A 1U CUBESAT IN LOW EARTH ORBIT

Abstract

This paper is concerned with the thermal housekeeping data generated onboard a 1U CubeSat, MYSAT-1, in low earth orbit. The actual flight data was collected using 14 temperature sensors and then used to validate a numerical multi-physics model for CubeSats. The model is based on a single isothermal node approach and takes into account the orbital parameters as well as the eclipse and the solar illumination cycles on each surface of the CubeSat. In addition, the model includes the effects of the albedo and Earth Infrared heat fluxes. The presented simulations and results from the validated model were used to draw conclusions on the worst hot and cold case scenarios for MYSAT-1. In addition, a sensitivity analysis was carried out to investigate the assumed specific heat capacity effect on the generated temperature cycles.