Title of the Contribution:
Thermal Analysis of the CubeSat First-MOVE in Preparation for Launch using ESATAN-TMS r4

Abstract:
This paper discusses the thermal analysis of the one unit (1U) CubeSat, First-MOVE (Munich Orbital Verification Experiment), designed and built at the Institute of Astronautics of the Technische Universität München (TUM) [1]. This analysis was carried out using ESATAN-TMS r4. A geometric model of the satellite was created using commercial CAD software. This was simplified and extraneous features removed before importing into ESATAN. The thermal model was derived by applying appropriate material properties and power dissipation loads and by including manually calculated thermal links in the model. The enhanced thermal model was then validated by comparing the simulation with the results of a thermal chamber test. Orbital analyses were performed for both a hot and cold environmental case, as well as for high and low levels of power dissipation. The results of these simulations confirm that all satellite components will remain well within their survival temperatures throughout the mission lifetime. The model was further used to plan the satellite’s thermal acceptance tests, reducing the time and cost incurred in testing. On completion of thermal acceptance tests the thermal system was found to be adequate for mission requirements and the satellite was deemed flight ready.
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