IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Vehicles – Mechanical/Robotic/Thermal/Fluidic Systems (7)

Author: Mr. Ibrahim Alsabt
Sharjah Academy for Astronomy, Space Sciences and Technology (SAASST), United Arab Emirates, ialsabt@sharjah.ac.ae

Ms. Tarifa AlKaabi
Sharjah Academy for Astronomy, Space Sciences and Technology (SAASST), United Arab Emirates, talkaabi@sharjah.ac.ae
Mr. Sahith Reddy Madara
Sharjah Academy for Astronomy, Space Sciences and Technology (SAASST), United Arab Emirates, smadara@sharjah.ac.ae
Dr. Ilias Fernini
Sharjah Academy for Astronomy, Space Sciences and Technology (SAASST), United Arab Emirates, ifernini@sharjah.ac.ae
Mr. Bogac Karabulut
Istanbul Technical University, Turkey, bogackarabulut@gmail.com
Mr. Egemen Catal
Istanbul Technical University, Turkey, egemencatal@gmail.com
Prof. Hamid Al Naimiy
Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST), United Arab Emirates, alnaimiy@sharjah.ac.ae
Dr. Alim Rüstem Aslan
Istanbul Technical University, Turkey, aslanr@itu.edu.tr

SHARJAHSAT-1 THERMAL ANALYSIS FOR ORBIT-LAUNCH SELECTION

Abstract

SharjahSat-1 is a collaborative research project by the Sharjah Academy for Astronomy, Space Science, and Technology (SAASST), University of Sharjah (UoS), Istanbul Technical University (ITU), and Sabanci University (SU). The 3U CubeSat will implement an improved X-ray Detector (iXRD), as the primary payload, and a secondary payload, which is a system of two optical cameras. The X-ray detector's objective is to detect hard X-rays from very bright X-ray sources, and to study the solar coronal holes, whereas the camera system will provide a low-resolution remote sensing application. SharjahSat-1 would be the first CubeSat mission to be developed by the SAASST team and UoS students, which aims to build capacities and expertise that would be of much value for the following future CubeSat missions.

The thermal analysis of the SharjahSat-1 is a crucial step to assure the safety of the internal systems of the satellite from the harsh conditions of outer space. Each component of the satellites has different operating temperature requirements. Since passive thermal control methods are mostly used for smaller satellites, and no means of active thermal control systems are to be used on SharjahSat-1, it is critical to ensure that each component would remain in the allowable temperature range that it was designed to operate in throughout the satellite's mission.

According to three different orbits that are chosen based on the suitable launching options available in the Q4 of 2020 and Q1 of 2021, a detailed thermal model of SharjahSat-1 is developed using commercial software. The simulations are carried out to help evaluate mission viability in different orbits in relation to

subsystems' temperature limits. The thermal tests will be performed to support modelling and analysis in the thermal vacuum chamber of ITU-Space Systems Design and Test Laboratory. The simulated scenarios on the different orbits will enable us to choose the best orbit, in terms of assuring the safety of the satellite's internal systems, since an appropriate thermal analysis design could potentially save the mission from failure and extend mission lifetime.