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Assessment of the influence of mechanical joints on thermal conductance between structural elements in the small-satellite thermal model.

HyperSat is a new, modular microsatellite platform for space missions to be realized in a short time and at a low cost. It can support missions of a single satellite or constellation of spacecrafts. Currently, the HyperSat platform is under development. One of its crucial components is Thermal Control Subsystem.

In the space vacuum environment convection does not take place. Hence, the generated heat is transferred by conduction to the outer surfaces of the satellite structure and radiated to the surrounding space. Because of surface imperfections, micro gaps may occur between two contacting elements leading to decrease in the heat transfer. Therefore, understanding of the thermal conductance in the space environment as well as the proper assessment of its impact on the satellite thermal model accuracy in comparison to the physical model is of a prime importance. The objective of this paper is to examine the influence of mechanical joints on the thermal conductance and to describe the methodology of its study. Furthermore, a design of the laboratory test, on which the conductance validation tests will be carried out, is presented. The topics tackled in the paper will be further developed and the resulting conclusions will be considered in the final Structural Thermal Model (STM) design of the HyperSat platform.

Primary authors: Mrs TUREK, Patrycja (Creotech Instruments S.A.); Prof. FURMAŃSKI, Piotr (Warsaw University of Technology); Dr ŁAPKA, Piotr (Warsaw University of Technology)

Presenters: Mrs TUREK, Patrycja (Creotech Instruments S.A.); Prof. FURMAŃSKI, Piotr (Warsaw University of Technology); Dr ŁAPKA, Piotr (Warsaw University of Technology)

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