

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
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DETERMINATION OF THERMAL CONTACT RESISTANCE IN THERMO-VACUUM CHAMBER  
EXPERIMENTS

**Abstract**

Thermal contact resistance (TCR) caused by surface imperfections results in a reduced heat transfer rate on the interface of two solids in contact. The exact prediction of these resistances may enhance the accuracy of the thermal conductance measurements in a thermo-vacuum chamber. Such an enhancement is crucial for the development and performance testing of the Miniaturized Heat Switch – a passive thermal management unit for satellites or robotic missions. This study presents an experimental investigation of low contact-pressure TCR within thermo-vacuum chamber measurement. We will use a custom-built experimental setup to measure the steady-state temperature difference across the calibration specimen and chamber interface while varying the applied heat load and surface roughness of the test article. The resistance data is correlated with an analytical model to find a correction function and determine the accuracy of the thermal conductance measurement. The results quantify the effect of low contact-pressure TCR within the experiments and provide insights into the design of heat transfer interfaces. This knowledge may be also applied in heat switch technology that relies on efficient heat transfer.