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Master Degree Course Electronics Engineering, MSc EE

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Positioning of Thermal Sensor´s for MASCOT Orientation.

ABSTRACT - Masterthesis

This thesis is based on the uncertainty of MASCOT's orientation once it has landed from the mobility manoeuvre. Due to design constraints, primarily that of a low mass budget of 10 kg, and high payload mass of 3 kg, MASCOT has little mass left for overly complicated and heavy attitude determination systems. It was proposed to equip MASCOT with thermal (or temperature) sensors an each side of the landers body.

By measuring the steady state temperature difference of each side of MASCOT, it is possible to determine which sides of MASCOT are facing the asteroid surface, facing the sun, or facing the empty blackness of space. A selection of these optical coatings, specific to the asteroid soil, the solar radiation spectrum and black space radiation are chosen for the thermal sensors, and tested in a simulated space environment.

Furthermore, numerous numerical simulations based an varying initial temperature and times to reach steady state temperature is performed, to ensure the system will function in a manner appropriate to the scientific tasks required of MASCOT. Simulations on angles, vectors and radiation will also be carried out to determine algorithms and expected values of steady state temperatures against different inclinations from the surface, and at different times during the asteroid day.