

Research Practice/Semester thesis/Term Paper

FEM analysis of a slip ring for a lunar rover instrument

theoretical/numerical thesis

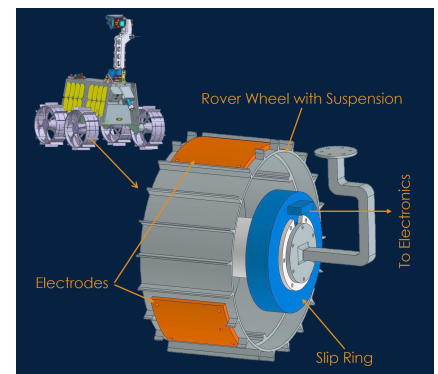
Start date: immediately possible

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Topic:

The Rover Permittivity Sensor (RPS) is an instrument built by TUM to be integrated into the wheel of the Rashid 3 rover from MBRSC (UAE) and is expected to fly to the Moon in 2028. The sensor consists of two electrodes mounted to one rover wheel and connected via a slip ring to electronics inside the rover. Mounting the electrodes on the wheel allows RPS to map the lunar subsurface permittivity and infer water content along the rover track.

To improve and qualify our slip ring design we need a structural analysis in the form of a finite element model. The slip ring and its delicate parts must survive launch vibration as well as large temperature changes on the lunar surface. The work will create a model that supports vibration simulations and thermo-mechanical simulations. The model will be correlated with tests of the existing prototype and provide improvement inputs for the next design iteration.



Tasks:

- Study the expected vibration and thermal environment of the slip ring.
- Define requirements for the structural analysis.
- Build an FEM model (NX Nastran)
- Use existing test data for correlation.
- Deliver inputs for design improvements and further testing.

Requirements:

- MSc Mechanical, Aerospace or related
- A good understanding of structural dynamics and finite element analysis.
- Experience with Matlab or Python for data processing
- Any experience other types of structural or thermal modelling is beneficial.
- Any experience with structural or thermal testing is beneficial.

Supervisor:



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