



### Bachelor Thesis Work

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German thesis title

#### Analysis of the scientific performance of a satellite observing re-entries

##### Motivation:

The IRAS (Integrated Research platform for Affordable Satellites) project, funded by the Ministry of Economics, Labor and Housing of Baden-Württemberg, was established to respond to the space demand for low-cost satellites for volume production. However, launching many satellites also implies a strong responsibility to prevent space debris, which means that satellites should be deorbited as quickly as possible after decommissioning. Making sure that re-entering satellites cause no risk to people and infrastructure on Earth requires to well understand the demise process of such bodies.

The satellite mission OREUS under development at IRS has the objective to demonstrate technologies developed within the IRAS project, and to apply a new digital engineering platform. The scientific objective of the mission is the observation of atmospheric entry events in order to better the understanding of material demise in the upper atmosphere. Therefore a UV spectrometer is planned for the identification of material characteristics during atmospheric entry for meteors, satellites or upper rocket stages.

In the scope of this thesis, the scientific performance depending on instrument and engine parameters as well as the type of re-entry event should be analysed. Therefore, the accuracy of re-entry predictions and necessary orbital manoeuvres for the observation of these events should be analysed, in order to calculate the necessary amount of propellant and number of feasible observations for the OREUS mission. In the end, suitable mission requirements should be developed, giving the number and types of feasible observations as well as the propulsion demand to perform orbital manoeuvres.

##### Task:

- Familiarization with re-entry predictions and the OREUS satellite
- Recognition of the requirements and boundary conditions for re-entry observations (e.g. from instrument and satellite bus)
- Research and analyse achievable re-entry prediction accuracy
- Determine needed orbital manoeuvres
- Calculate necessary amount of propellant and number of feasible observations
- Documentation of results

Supervisor: Names internal supervisors

Starting date: Click for date

Submission until: Click for date

##### **Acknowledgement of receipt:**

I hereby confirm that I read and understood the task of the bachelor thesis, the juridical regulations as well as the study- and exam regulations .

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Prof. Dr.-Ing. Sabine Klinkner  
(Responsible Professor)

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Signature of the student

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