



Master Thesis Work

of Choose title Name, Surname

Auslegung und Test des Pointingreglers für den EIVE CubeSat

Implementation and Test of a Pointing Controller for the EIVE CubeSat

Note:

This thesis can be completed entirely in English. Since the thesis is of theoretical nature, it can be conducted without presence at the IRS. Good knowledge in control system engineering is required. No prior experience of the GAFE framework is needed, however, Matlab skills are appreciated.

Motivation:

The nanosatellite project EIVE, a cooperation between the University of Stuttgart and scientific and industrial partners, aims to demonstrate the functionality of novel E-band transmission technology onboard a 6U CubeSat in space.

A reliable and accurate attitude control is essential for the function of the E-band payload which requires a pointing accuracy of less than 1°. Attitude determination is enabled by sun sensors, magnetometers, gyroscopes, and a star tracker. This attitude determination information is fused inside an Extended Kalman Filter. Magnetorquers and reaction wheels enable the attitude control.

Earlier student theses implemented the attitude control hardware within the GAFE framework which enables simulations in a modelled space environment.

The task of this thesis is to research and select control laws for the pointing modes and find the optimal control law parameters for both the pointing and the safe mode control laws. A verification of the control laws and the determined control parameters is to be conducted with GAFE.

Task description of the Master thesis work:

- Introduction to the topic of attitude determination and control for CubeSats
- If applicable adaptation of the implementation of ACS sensors and actuators in GAFE
- Development of the pointing mode control laws
- Simulation of relevant scenarios of operation
- Optimisation of the control law parameters and stability analysis
- Documentation

Supervisor: Thorben Löffler, Markus Koller

Starting date: as soon as possible

Submission until: [Click for date](#)

Acknowledgement of receipt:

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

Date

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

Date

Signature of the student

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