

Bachelor Thesis Work

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Erstellen eines parametrischen Skalierungsmodells für Kommunikationssysteme von Satelliten

Development of a parametric scaling model for satellite communications systems

Motivation:

In the earliest design stages of a satellite project, trade studies are often done using parametric scaling models. These enable the evaluation of many different possibilities to fulfil the mission objectives, which allow for an optimization of the satellite design.

Within the IRAS (Integrated Research platform for Affordable Satellites) project funded by the Ministry of Economics, Labor and Housing of Baden-Württemberg, solutions for lowering satellite costs are under examination. This includes new technologies for electronics, structures and propulsion systems, but also a new development platform called DCEP (Digital Concurrent Engineering Platform). One purpose of this platform is to connect software tools for automation of individual design tasks, which will allow an automated multi-dimensional optimization of the entire mission. Currently, two tools are being developed at the IRS for use with the DCEP: the Evolutionary Satellite Design Converger (ESDC), and a constellation design tool.

Within the scope of this thesis, a scaling model for communications systems should be developed. The model should allow estimation of power and mass of a communication system with respect to several parameters (e.g. frequency, output RF power, half-power beam width, data rate), as they change with altitude or other orbit or constellation parameters, and should provide relevant output data for other spacecraft systems, i.e. power and attitude control requirements. It should be applicable for both communications payloads, as well as for telemetry & telecommand or data downlink subsystems of the satellite bus. The model should be based on a hardware database, which should allow updating the scaling model with future developments.

Please contact Martin Fugmann: fugmann@irs.uni-stuttgart.de

Task:

- Literature research on state-of-the-art satellite communications systems and components
- Identification of necessary input and output parameters
- Set-up of an extendable database including the required data
- Implementation of a tool to automatically generate scaling laws based on the database
- Documentation

Supervisor: Martin Fugmann, Manfred Ehresmann

Starting date: Click for date

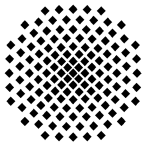
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Acknowledgement of receipt:

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.

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

Signature of the student



Declaration

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