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Author: Mr. Jonathan Lange
Luleå University of Technology, Sweden, aster.rexus@gmail.com

Ms. Diane Delley
Luleå University of Technology, Sweden, diadel-9@student.ltu.se
Mr. Björn Dierks
Luleå University of Technology, Sweden, Dierksbm@gmail.com
Ms. Flavia Pérez Cámara
Luleå University of Technology, Spain, flavia.perezcam@gmail.com
Ms. Paloma Maestro Redondo
Luleå University of Technology, The Netherlands, palmae-9@student.ltu.se
Mr. Ric Dengel
Luleå University of Technology, Germany, ric.dengel@outlook.com
Mr. Noel Janes
Luleå University of Technology, Sweden, noejan-9@student.ltu.se
Ms. Elena Fernández Bravo
Luleå University of Technology, Sweden, elefer-9@student.ltu.se
Prof. Thomas Kuhn
Luleå University of Technology, Sweden, thomas.kuhn@ltu.se

ASTER: DEVELOPING A HIGH PERFORMANCE ATTITUDE CONTROLLED PLATFORM FOR LOW-COST EXPERIMENTS

Abstract

An important aspect of the low-cost development of spacecraft components is its verification of the functionality under microgravity conditions. Microgravity is an important field of research, providing a suitable testbed for new technologies, in order to mimic the conditions of such projects. Microgravity experiments undertaken on sounding rockets however, cannot achieve true microgravity conditions unless stabilised due to residual external forces acting on the experiment, such as the rocket's spin.

Project ASTER (Attitude STabilised free falling ExpeRiment) is taking advantage of the extended microgravity period of a sounding rocket flight to test a high performing, low-cost ACS solution. This would greatly benefit both future exploration missions and sounding rocket experiments which require highly accurate stabilisation and pointing capabilities. The proposed design utilises three reaction wheels to stabilise a Free Falling Unit ejected from a sounding rocket within seconds. The platform will be able to perform slewing manoeuvres and accommodate future experiments on easily adaptable mounting points. ASTER will be launched on-board REXUS 30 in March 2022, after which the obtained results will be published on an open source basis to ensure its future availability to student and low budget research projects, thereby allowing further improvement, optimisation, and customisation. ASTER is being developed as part of the 13th Cycle of the German-Swedish student programme REXUS/BEXUS.