

ASTRODYNAMICS SYMPOSIUM (C1)

Attitude Dynamics (2) (4)

Author: Mr. Ansgar Heidecker

German Aerospace Center (DLR), Germany, ansgar.heidecker@dlr.de

Dr. Takahiro Kato

German Aerospace Center (DLR), Germany, kato.takahiro@dlr.de

Dr. Olaf Maibaum

German Aerospace Center (DLR), Simulation and Software Technology, Germany, Olaf.Maibaum@dlr.de

Prof. Matthew Hölzel

University of Bremen, Germany, hoelzel@uni-bremen.de

ATTITUDE CONTROL SYSTEM OF THE EU:CROPIS MISSION

Abstract

The Eu:CROPIS (Euglena Combined Regenerative Organic food Production In Space) satellite, scheduled for launch in 2016, is the next mission to be launched as part of the German Aerospace Center's (DLR) compact satellite program. The mission is currently in Phase C and is being developed by several institutes within DLR. The mission's focus is to test several biological experiments at different levels of gravity. The payload modules are provided by some DLR institutes, the University of Erlangen (GER) and NASA-AMES. The satellite itself has a mass of about 220 kg and includes several subsystems which directly interfere with the attitude control system (e.g. deployable solar panels, liquid pumps and venting devices).

This paper provides a detailed overview of the Eu:CROPIS Attitude and Orbit Control System (AOCS). It starts by presenting the design driving requirements and explains how the required g-levels are achieved purely by a magnetic spin stabilization concept. Following this is a presentation of the ACOS modes and a discussion of the chosen sensors and actuators. The attitude determination and attitude control algorithms are described in detail including their design and verification. Finally, an outlook is given for further verification and integration steps of the Eu:CROPIS satellite.