ASTRODYNAMICS SYMPOSIUM (C1)
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Author: Mr. Sten Berge
Swedish Space Corporation (SSC), Sweden, sten.berge@ssc.se

Mr. Anders Edfors
Swedish Space Corporation (SSC), Sweden, anders.edfors@ohb-sweden.se
Mr. Torbjörn Olsson
Swedish Space Corporation (SSC), Sweden, torbjorn.olsson@ohb-sweden.se
Dr. Bernhard Lübke-Ossenbeck
OHB System AG-Bremen, Germany, bernard.luebke@ohb-system.de

ADVANCED AOCS DESIGN ON THE FIRST SMALL GEO TELECOM SATELLITE

Abstract

The advanced Attitude and Orbit Control System (AOCS) design of the Small GEO platform is now being adapted for the first commercial mission. The Small GEO telecommunications satellite is a new development to fill a niche in the telecom industry for small platforms weighing about 1.5 tonnes and targeting payloads of 300 kg and 3 kW. The first mission will launch into Geostationary Transfer Orbit (GTO). Small GEO is being developed by a Consortium led by OHB-System AG. The Swedish Space Corporation is a partner in the Consortium and supplies the AOCS and Electric Propulsion (EP) subsystems. The project is currently in Phase C and the first mission will fly in 2012. This article gives an overview of the AOCS development status.

The AOCS architecture is a three-axis stabilized system using reaction wheels for attitude control, star trackers for attitude determination, and EP for orbit control. The AOCS software is being developed using model-based design techniques and test driven development. Results from subsystem level testing of flight code will be presented.

The AOCS design is characterized by a number of advances in technology beyond traditional telecom satellite designs. Perhaps the largest deviation from a traditional design is complete reliance on EP for orbit control. Angular momentum management of the reaction wheels relies solely upon EP in the nominal modes. The EP is not used in the safe modes and therefore a cold gas system is included on-board. The cold gas system uses Xenon, the same fuel used by the EP. Another advance is the reliance upon APS-based star trackers. APS (Active Pixel Sensor) star trackers have a number of advantages over their CCD-based cousins in terms of robustness. The traditional fine sun sensor is simplified to a fault tolerant system of solar cells giving low, but more than adequate, accuracy. In addition, a GPS sensor will be flown on-board as an experiment.