

20th SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Generic Technologies for Small/Micro Platforms (6A)

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SDS-4 ATTITUDE CONTROL SYSTEM: FLIGHT RESULTS OF ATTITUDE CONTROL SYSTEM
FROM NOMINAL OPERATION AND EXTEND MISSION**Abstract**

The Small Demonstration Satellite (SDS) program is a JAXA technology demonstration program, targeting the in-orbit demonstration of advanced technologies using small satellites. Following the success of SDS-1, the SDS-4 spacecraft was successfully launched on 18 May 2012 and continues the in-flight demonstration of SPace-based Automatic Identification System Experiment (SPAISE), Quartz Crystal Microbalance (QCM) for monitoring contamination environment around the spacecraft, Flat-plate heat pipe eXperiment (FOX), and In-flight experiment of Space materials using THERME which is developed by the JAXA-CNES joint research program. The SDS-4 evolves on a 677-km Sun-synchronous orbit with ascending node at 13:30 PM. The inclination of orbit is 98 degrees.

This paper describes the in-flight results of Attitude Control System for 50kg class small satellites. The SDS-4 attitude control subsystem provides 3-axis zero-momentum stabilized control by using reaction wheel with three magnetic torquers for detumbling of body angular rates after launch and momentum dumping of the reaction wheels. The attitude determination is based on Kalman-filter estimation using a star tracker (STT), digital sun sensor (DSS), MEMS three axis gyro (VSGA) and a magnetic sensor (MAGS). 5 coarse sun sensors (CSS) are used for detection of sun.

Lessons and learned from the 1 year operation and ACS flight experiments are provided.