

SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND
SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Technology Needs (Part 1) (1)

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PAYLOAD CALIBRATION MANEUVERS FOR ASTROSAT

Abstract

Astrosat spacecraft is India's first mission dedicated to Space based Astronomy. It carries six payloads for observations in various bands of the electromagnetic spectrum. The payloads require periodic calibrations, for which the spacecraft has to be maneuvered to trace certain particular patterns in the sky. The payloads are mounted about the y axis, and the objective of the calibration is to make a source fall at different points in the field-of-view of the payload camera. In order to trace profiles, it is required to rotate the spacecraft about the x and the z axis. Also there are certain scans where a pure rate motion is required in a vertical plane. A unified formulation is proposed which takes care of arbitrary patterns apart from the ones that are defined till date.

The entire area of interest is assumed to be a rectangle of defined angular length and width. The area is divided into points, the number of points decided based on the angular resolution. The centre of the rectangle is assumed to be the origin and the points are specified as angular offsets w.r.t the centre. This information is formed as a look-up table which consists of attitude, rate and timing information. This greatly simplifies the load on the on-board control software and also any two dimensional pattern can be accommodated. A novel way of handling the rate scan is to force the proportional term of the controller to zero so that pure rate motion is achieved. The algorithm is extensively simulated and tested in HILS environment.