

ASTRODYNAMICS SYMPOSIUM (C1)
Mission Design, Operations and Optimization (8)

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ATTITUDE MANEUVER DESIGN WITH PATH CONSTRAINTS FOR INDIAN ASTRONOMY
SATELLITE - ASTROSAT

Abstract

Astronomy satellites carry sensitive instruments onboard for celestial observations. These instruments should not see bright objects such as Sun, Moon and Earth albedo while undergoing maneuvers. ASTROSAT is an Indian ASTRONomy SATellite with instruments having capability of observing celestial objects in multi-wavelength. ASTROSAT carries 5 payloads: (i) Ultra-Violet Imaging Telescope (UVIT) which operates in three wavelengths namely Far Ultra-Violet, Near Ultra-Violet and Visible bands, (ii) Soft X-ray Telescope (SXT), (iii) Large Area X-ray Proportional Counters (LAXPC) having total area of 6400 sq cms, (iv) Cadmium Zinc Telluride Imager (CZTI) and (v) Scanning Sky Monitor (SSM). In this, UVIT, SXT and SSM should avoid bright objects while the spacecraft maneuver from one celestial object to another. In this paper, a simple maneuver strategy developed to avoid bright Sun while maneuvering the spacecraft when the satellite is not in radio contact has been described. The Sun constraint of the instruments as well as the star sensors during observation is met using a pre-conceived definition of the spacecraft axes. However, during maneuver, the instruments are kept away from Sun to avoid damage and the Star sensor is allowed to pass through Sun quickly. The procedure is tested for various combinations of the celestial objects in order to ascertain that the method works without fail. Finally, the procedure has been planned for implementation onboard ASTROSAT in order to have the autonomy of operations of the satellite. In this paper, the strategy and various simulation results are presented.