

ASTRODYNAMICS SYMPOSIUM (C1)
Attitude Dynamics (2) (9)

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LONG TERM PASSIVE ATTITUDE STABILISATION USING RADIATION TORQUES

Abstract

The impact of solar radiation can be used to control the attitude of an object through the use of control vanes and by modulating the reflectivity of the surface of the object. Active control however must be maintained in order to maintain attitude. This paper presents a passive approach to the attitude control of objects based on static surface features coupled with gravitational and eddy current damping. The proposed approach is designed to work over long timescales, particularly in situations where a known attitude would greatly aid the tracking and removal of an object. The approach is based on the creation of ridges on the surface of the object, with differing reflectivity on each side of the ridge. Radiation with a non-normal incidence to the surface can induce a torque to either reduce or increase the angle of incidence of the radiation source depending on the design of the ridges. The radiation torque acts towards or away from the radiation source direction but by itself is not enough to stabilise the object around a desired axis. The torques created must be damped and in this study gravitational and eddy current torques are simulated for a number of objects with faces covered in the proposed material.