

ASTRODYNAMICS SYMPOSIUM (C1)

Attitude Dynamics (2) (4)

Author: Mr. wei wang

Shanghai Institute of Satellite Engineering, China, wwei_bhu@126.com

Mr. Baodong Fang

Shanghai Institute of Satellite Engineering, China, spacecraft509@gmail.com

Mr. Yuming Peng

Shanghai Institute of Satellite Engineering, China, deepspace509@126.com

ATTITUDE DETERMINATION FOR SMALL SPIN SATELLITE BASED ON NAVIGATION
RECEIVER WITH SINGLE ANTENNA

Abstract

This paper describes an attitude determination method for the small spin satellites based on the carrier phase differences from a navigation receiver tracking loop with single antenna. Compared with the traditional methods of multi-antennas, this new method will have smaller size, use less power and avoid integer ambiguity resolved. The rotation movement of the satellite will cause the carrier phase of the navigation receiver varying periodically. This paper establishes the algorithm model of determining the spin satellite's attitude from the carrier phase differences outputted by the Phase-Locked Loop Discrimination. In simulation, when using an antenna radius of 0.3 m, a rotation rate of 20 RPM, with the 3mm carrier phase error and 0.1deg/s angular velocity error, it makes the vector of the spinning axis of the satellite have an error of 2.17 deg. The results show that it is feasible that using a navigation receiver with single antenna can determine the attitude of the small spin satellites with low angular velocity and low precise gyroscope.