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Author: Dr. zhao Hongbo
China, h84b@163.com

HIGH ACCURACY MEASUREMENT TECHNOLOGY FOR SATELLITE DEPLOYABLE BAR'S SMALL ANGLE DEFORMATION BASED ON THE LASER DEVICES AND POSITION SENSORS

Abstract

In order to meet the applications of geomagnetic navigation, it is needed to measure the earth's magnetic field. Because of the coherence of the earth's magnetic field, the model of global magnetic field can be got through inversion the measurement data of geomagnetic survey satellites. The global magnetic field inversion is got by the magnetic measuring instrument(vector field magneticmeter, VFM) of geomagnetic survey satellites. Through the analysis of the magnetic measuring instrument's pointing accuracy, the variety of the installation matrix between the star sensor and VFM must be very small. In order to meet installation matrix' accuracy, it is needed to install the star sensor and VFM on a light, non-magnetic, high strength deployable bar. Though the installation matrix can be pre-calibrated on the ground, it would be deformation for the complex thermodynamic environment in orbit. Then it is needed to measure the installation matrix in orbit. A calibration method based on laser and position sensor was put forward in this paper. Firstly, the rotation and bend of the bar under different thermal environments were analyzed, then, the measure principle and method based on laser and position sensor was introduced. The method's feasibility was proved by calculation and experiment. Finally, the validate method of the scheme's accuracy was given. Key words: Earth's magnetic field, Small angel, Laser devices, Position sensors