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Author: Mr. Osamu Takahara
Mitsubishi Electric Corporation, Japan, Takahara.Osamu@ds.MitsubishiElectric.co.jp

Mr. Shimizu Seiichi
Mitsubishi Electric Corporation, Japan, Shimizu.Seiichi@ct.MitsubishiElectric.co.jp
Dr. Kazuhide Kodeki
Mitsubishi Electric Corporation, Japan, Kodeki.Kazuhide@db.MitsubishiElectric.co.jp
Dr. Takeya Shima
Mitsubishi Electric Corporation, Japan, Shima.Takeya@cb.MitsubishiElectric.co.jp
Mr. Hitoshi Kitamura
Mitsubishi Electric Corporation, Japan, Kitamura.Hitoshi@ds.MitsubishiElectric.co.jp
Mr. Masato Takahashi
Japan Aerospace Exploration Agency (JAXA), Japan, takahashi.masato@jaxa.jp
Mr. Takashi Kobayashi
Japan Aerospace Exploration Agency (JAXA), Japan, kobayashi.takashi2@jaxa.jp
Mr. Naoki Miyashita
Japan Aerospace Exploration Agency (JAXA), Japan, miyashita.naoki@jaxa.jp

STUDY OF IMAGE CORRECTION METHOD USING IMAGE MOTION DETECTED WITH INERTIAL SENSORS

Abstract

Currently, there is a requirement for high pointing accuracy of earth-observation satellite and astronomy satellites, in order to acquire high resolution and high quality of images. For the above purpose, some countermeasures are taken against the microvibration which is induced by disturbance sources such as RWAs, Inertial Reference Unit. One method is to install isolator for reduction of image blur induced by microvibration. Other is to correct images acquired by telescopes. This paper focuses on the image correction. In order to correct images, it is necessary to detect the pointing error of an optical telescope in synchronization with the image acquisition in orbit. As the method of detection of the pointing error, the inertial measurement method used for evaluation of pointing error in ground test, is applied. The inertial measurement method is to detect the motion of the pointing error of the telescope by measuring translational and rotational motions of each optical element of the telescope with inertial sensors such as accelerometer, and subsequently converting the motions of optical elements to the pointing error. The method was applied for the some high-precise observation satellites such as the solar observation satellite "Hinode (SOLAR-B)" in ground test. In the study, the data acquired in the microvibration test, using the satellite bus structure in which the mock optical system and some AOCS components were installed, is used. The data includes the pointing error of the mock optical system measured by optical measurement and the pointing error measured by the inertial measurement method. The pointing error by the optical measurement is used as the true value of the pointing error. The possibility of the compensation of the true pointing error using the pointing error by inertial measurement, is evaluated. The influence on the compensation by the reduction of the number of the inertial sensors is also evaluated. This paper describes the concept of the method of image correcting, introduction of the inertial measurement method, the validity of the inertial measurement method, and then the result of the feasibility study on the image

correcting method with the inertial measurement data.