IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Navigation Systems, Services, and Applications (6)

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SATELLITE POSITIONING DETERMINATION BY USING THE EARTH MAGNETIC FIELD IN THE LEO

Abstract

The main purpose of this paper is to present the methodology to determine the satellite position based on the earth magnetic field in the Low Earth Orbit (LEO). To this end, magnetic field model is derived and drawn based on the variation altitude, orbit inclination, geographic latitude and longitude in specified ranges. The derived model is coded in MATLAB and can be used in the satellites to determine their position. The specification of the method is the common application from the magneto-meter in the satellites. The satellites used the magnetometers for attitude determination and also used for the positioning determination based on the developed method. The proposed method has some advantages such as: high speed in process and online position determination for transferring the position to ground station by using the telemetry. Hence, the variation of magnetic field vector is derived from the developed model. The variation of magnetic field can help to verify the orbit determination in the satellite system design process. The result of the magnetic field model which is derived by MATLAB code is compared with the Satellite Tool Kit (STK) original magnetic field model. The result of this comparison proves the accuracy of developed model in this paper. When navigation sensors may be failed because of any possible reason, the proposed method is highly reliable to be replaced.