Error analysis of pico-satellite attitude angle measurement based on magnetometer

Yu F.-X., Zheng Y.-M., Xie C.-X., Jin J.-J., Jin Z.-H.

Department of Aeronautics and Astronautics, Zhejiang University, Hangzhou 310027, China; Department of Information and Electronics Engineering, Zhejiang University, Hangzhou 310027, China

Abstract: The method of obtaining attitude angle by the comparison of the magnetic field vector from actual measurement using 3-axis magnetometer with the data calculated from orbit propagation and International Geomagnetic Reference Field (IGRF) model is suitable for pico-satellite application of small volume, light weight, and low power consumption. The attitude angle error consists of magnetic field vector measurement error and magnetic field vector calculation error. After the analysis, it was clear that A/D converter, magnetic sensor error, temperature, nearby ferrous materials, etc. will result in measurement error up to 1.74°. And the calculated magnetic field vector error is about 0.5° when Kepler orbit propagator and IGRF model was used. Therefore, the total attitude angle error is 2.24°.

Author Keywords: 3-axis magnetometer; Angle error analysis; Basic disciplines of aerospace and technology; Pico-satellite

Year: 2007

Source title: Jilin Daxue Xuebao (Gongxueban)/Journal of Jilin University (Engineering and Technology Edition)

Volume: 37

Issue: 6

Page : 1460-1464

Link: Scorpus Link

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Yu, F.-X., Department of Aeronautics and Astronautics, Zhejiang University, Hangzhou 310027, China
2. Zheng, Y.-M., Department of Information and Electronics Engineering, Zhejiang University, Hangzhou 310027, China
3. Xie, C.-X., Department of Information and Electronics Engineering, Zhejiang University, Hangzhou 310027, China
4. Jin, J.-J., Department of Information and Electronics Engineering, Zhejiang University, Hangzhou 310027, China
5. Jin, Z.-H., Department of Information and Electronics Engineering, Zhejiang University, Hangzhou 310027, China