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## RESEARCH ON CALIBRATION METHOD OF HIGH ORBIT STAR SENSOR LOW FREQUENCY ERROR

### **Abstract**

Among the error classes of a star sensor, the low frequency error has been detected in many spacecrafts and is the most critical factor to get high-accuracy spacecraft attitude determination. The low frequency error is caused primarily by the periodic thermal distortion of the star sensor and its bracket, so low frequency error characteristics of high earth orbit star sensor are different from those of low earth orbit star sensor. In this paper, the low frequency error is formulated as a Fourier series, in which characteristics of high earth orbit star sensor are considered, and the Fourier coefficients are assumed time-constant. Based on cubature Kalman filter, an novel calibration method is developed to estimate the Fourier coefficients, gyro drift and quaternion. Meanwhile, the payload of Earth observation satellite can provide high precision landmark information, which is adopted as the observation in the proposed approach. The numerical simulation example is performed to demonstrate the effectiveness of the calibration method.