

ASTRODYNAMICS SYMPOSIUM (C1)

Attitude Dynamics (2) (2)

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A METHOD OF GUIDE STAR SELECTION FOR STAR IDENTIFICATION IN THE CONDITION OF
HIGH BACKGROUND AND HIGH DYNAMIC**Abstract**

Star sensor uses star identification algorithm to get the inertial position information of the extracted stars in the image, and calculates the attitude by using the information. The Guide Star list is the important reference source for star identification. The quality of near infrared image taken by the star sensor in the condition of high background and high dynamic is worse than the visible one taken by CCD, with the problems such as the field of view is smaller, the detected star magnitude is higher, the background noise is more intensive, and the SNR is lower, and so on. A novel method of Guide Star selection which is trying to adapt to the above problems for star identification is proposed. The first, the stars which are not suitable to the star sensor are deleted on the base of astronomy star catalog, and then, a group of well-distributed dots on the surface of the unit sphere are gotten by making use of the regular polyhedron inscribed in a sphere, the equilateral triangle side segmentation, the spatial line projection, and so on. The next, a series of Guide Star selection regulations are designed corresponding to the parameters of star sensor optical and imaging system and star identification algorithm. And then, the stars are filtered by applying the above regulations to the star catalog in the circles of which the centers are the even dots on the sphere and the reference radius is the field of view of the star sensor. Finally, the needed Guide Stars list is obtained. Compared with the known, the Guide Star selection regulations and parameters of this method can be changed flexibly to adapt for the identification algorithm. Meanwhile, it substitutes the orthogonal coordinate system on the spherical surface for right ascension and declination, and thus the disadvantage of more stars on the low declination and few on the high declination is avoided. The simulation verifies that this method is simply calculated, adaptive, and the Guide Stars distributing uniformly. The result allows confirming its practical value in engineering.