



基于多台GPS接收机的三维姿态确定与精度分析

3-D Attitude Determination and Accuracy Analysis based on Multi-GPS Receivers

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中文摘要

主要介绍采用多台GPS接收机进行姿态确定的基本原理和精度分析。根据一个模拟动态定位实例,采用多台GPS接收机进行动态定位得到单历元定位结果,然后采用不同的天线组合进行姿态解算。结果显示,对于约5m长宽的基线组合,获得的航向角精度约为 0.05° ,横滚角和纵摇角的精度约为 0.2° 。对于约10m长宽的基线组合,航向角精度约为 0.03° ,横滚角和纵摇角的精度约为 0.11° 。可知,姿态角的精度与纵横向的基线的长度有关。当基线长度相同时,航向角的精度高于横滚角和纵摇角的精度。其中,航向角和纵摇角的精度主要与航向长度有关,而横滚角则与横向长度有关。基线越长,对应的姿态角的精度越高。

英文摘要

This paper presents the fundamental theory and the accuracy analysis of GPS attitude determination with several GPS receivers. According to a simulated data set, single epoch positioning results by kinematic positioning could be were obtained, and then the attitude could be were calculated with various antenna combinations respectively. The results show that when the length of the baseline is about 5m in square, the RMS for Yaw is about $\pm 0.05^\circ$, while Roll and Pitch are about $\pm 0.2^\circ$. When the length of the baselines is about 10m in square, the RMS for Yaw is about $\pm 0.03^\circ$, while Roll and Pitch are about $\pm 0.11^\circ$. So the accuracy of the attitude angles has a correlation is associated with the length of the transverse and longitudinal baselines. When the length of baselines is same, the accuracy of Yaw is higher than Roll and Pitch. The accuracy of Yaw and Roll is mainly related with depends on the length of longitudinal baselines transverse baselines, while the accuracy of Pitch transverse with depends on the length of transverse baselineslongitudinal baseline. In general, the longer the baseline, the higher accuracy of attitude angles will be.

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