

工程与应用

## UKF算法在星载GPS低轨卫星定轨中的应用

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收稿日期 2007-12-10 修回日期 2008-3-4 网络版发布日期 2008-11-18 接受日期

**摘要** 对于扩展卡尔曼滤波在非线性系统中由于线性化过程引入了线性化误差, 从而导致滤波器性能下降甚至造成滤波发散的情况, 利用Unscented卡尔曼滤波器对非线性系统进行直接滤波, 该方法无需对非线性系统进行线性化, 避免了线性化误差。并将该算法用于星载GPS低轨卫星定轨中, 建立了仿真模型, 在初始条件相同的情况下, 与EKF算法仿真结果相比较, 结果表明在一定观测噪声水平下, UKF定轨结果更准确, 定轨精度更高。

**关键词** [非线性系统](#) [Unscented卡尔曼滤波器 \(UKF\)](#) [星载GPS](#) [定轨](#)

分类号

## Unscented Kalman filter with application to orbit determination based on space-borne GPS

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### Abstract

Linearization error is introduced in the linearization process of extended Kalman, it can lead divergence of the EKF. To overcome this limitation, UKF algorithm is used directly to nonlinear system in this paper. Linearization is not needed to nonlinear system, so linearization error is voided. This algorithm is used in orbit determination based on space-borne GPS, emulation model is established. Under the same initial condition, the performance of EKF and UKF are compared by simulation, it is shown the performance of UKF algorithm is more precise and has higher accuracy in orbit determination under the certain observation noise level.

**Key words** [nonlinear system](#) [Unscented Kalman Filter](#) [space-borne GPS](#) [orbit determination](#)

DOI: 10.3778/j.issn.1002-8331.2008.33.065

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