

理论研究

## UKF、PF与UPF跟踪性能的比较

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**摘要** 无迹卡尔曼滤波器(UKF)是用一系列确定样本来逼近状态的后验概率密度,对任何非线性高斯系统都有较好的跟踪性能。粒子滤波器(PF)是用随机样本来近似状态后验概率密度函数,适用于任何非线性非高斯系统,但当似然函数出现在转移概率密度函数的尾部或者在高精度测量的场合,PF的跟踪性能降低。针对强非线性、非高斯系统、高精度测量的环境,文中提出采用UPF算法进行跟踪,并对PF、UKF和UPF三种跟踪算法进行了仿真,结果表明,UPF的跟踪精度要远高于PF、UKF的精度。

**关键词** [无迹卡尔曼滤波器](#) [粒子滤波](#) [无迹粒子滤波](#)

分类号

## Comparing of target-tracking performances of UKF, PF and UPF

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### Abstract

Unscented Kalman Filter (UKF) used a series of deterministic samples to approximate the state posterior probability density, and had better tracking performance for arbitrary nonlinear systems under the Gaussian conditions. PF (Particle Filter) used the random samples to approximate the state posterior probability density, and was suitable for any nonlinear/non-Gaussian systems. When the likelihood function appeared at the tail of the transfer probability density or observation model had higher precise, PF tracking performance reduced. Simulations about the strong-nonlinear, non-Gaussian and high precision measurements were done. Results showed that the tracking precision of UPF was far higher than that of PF and UKF.

**Key words** [Unscented Kalman Filter \(UKF\)](#) [Particle Filtering \(PF\)](#) [Unscented Particle Filtering \(UPF\)](#)

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