State Estimation for Target Tracking Problems with Nonlinear Kalman Filter Algorithms

Volume 98 - Number 17
Year of Publication: 2014

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10.5120/17277-7708
{bibtex}pxc3897708.bib{/bibtex}

Abstract

One the most important problems in target tracking are state estimation. This paper deals on estimation of states from noisy sensor measurements. Due to important of exact estimation in tracking problems must evader position and Line Of Sight angles estimated with least error rather than actual position. In this paper extended Kalman filter (EKF) and unscented Kalman filter (UKF) and Cubature Kalman Filter (CKF) are presented for bearing only Tracking problem in 3D using bearing and elevation measurements from tows sensors. The algorithms and model of system simulated using MATLAB and many tests were carried out. Simulation experiments show that the efficiency of EKF due to least RMSE have better performance on compared with the UKF algorithm. Also, the performance of EKF algorithm has been dramatically decreased when initialization (initial state assumption) is not good, which in this condition CKF method provides a more accurate approximation. Numerical results from Monte Carlo simulations show that the CKF have the best state estimation accuracy among all nonlinear filters considered. The proposed approach is interesting for the design of optimization algorithms that can run on target tracking systems.
Goutam Chalasani, Shovan Bhaumik 2011 "Bearing Only Tracking Using Gauss-Hermite Filter" IEEE
- Jouni Hartikainen, Arno Solin, and Simo Särkkä, August 2011 "Optimal filtering with Kalman filters and smoothers," Aalto-Finland,
- B. L. Scala, M. Morelande, 2008 "An Analysis of the Single Sensor Bearings-Only Tracking Problem," Radar- Con

**Index Terms**

Computer Science Algorithms

**Keywords**

Nonlinear filtering State estimation Extended Kalman filter Unscented Kalman Cubature filter Kalman filter