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Unscented Kalman filter based nonlinear state estimation case study-Nonlinear process control reactor (Continuous stirred tank reactor)

[Shyamalagowri M.](#)^a ; [Rajeswari R.](#)^b [Save all to author list](#)^a EEE, Erode Sengunthar Engineering College, Erode Tamil Nadu, India^b EEE, Government College of Technology, Coimbatore, Tamil Nadu, India**5** 29th percentile
Citations in Scopus[View all metrics](#) [Full text options](#) [Export](#) **Abstract**[Author keywords](#)[Indexed keywords](#)[SciVal Topics](#)[Metrics](#)**Abstract**

In this paper, UKF has been applied to a highly nonlinear CSTR, in order to investigate the performance achieved by the state and parameter estimator. The Unscented Kalman Filter has become a standard technique used in a number of nonlinear estimation. The use of the UKF to a broader class of nonlinear estimation problems, including nonlinear system identification, training of neural networks, and dual estimation problems. UKFs use nonlinear unscented transforms (UTs) in the prediction step in order to preserve the stochastic characteristics of a nonlinear system. The advantage of using UTs is their ability to capture the nonlinear behavior of the system, unlike extended KFs (EKFs) that use linearized models. Four original variants of the UKF for CSTR state estimation, based on different UTs, are described, analyzed, and compared. The four transforms are basic, general, simplex, and spherical UTs. This paper discusses the theoretical aspects and implementation details of the four UKFs. Experimental results for a non linear process control reactor CSTR is presented. It is concluded that the UKF is a viable and powerful tool for CSTR state estimation and that basic and general UTs give more accurate results than simplex and spherical UTs.

Cited by 5 documents

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Localization in perspective of
Analysis and Performance using
Unscented Kalman Filter

Ali, R. , He, Y. , Fu, W.
(2022) *Trends in Sciences*

Nonlinear state estimator for
Continuous Stirred Tank Reactor
using Weighted Point Kalman
filter

Ahmad Nazri, M.N.
(2022) *IET Conference
Proceedings*

Moving Object Tracking in 2D
Using State Estimation

Balani, B.G. , Nayak, B.B. , Soni,
S.
(2022) *Lecture Notes in
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The proposed methodology is tested on a simulated continuous stirred tank reactor (CSTR) problem to estimate 4 states of this nonlinear plant. The simulation results demonstrate the superiority of the suggested method in state estimation compared with the classical UKF-based approach. © 2016 IEEE.

Author keywords

Continuous Stirred Tank Reactor; Nonlinear process system; State Estimation; Unscented Kalman Filter; Unscented Transforms

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