

论文与报告

基于量测噪声和观测次数的EKF-SLAM一致性分析

李慧平, 徐德民, 张福斌, 姚尧

1. 西北工业大学航海学院 西安 710072

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摘要

Inconsistency is a fundamental problem in simultaneous localization and mapping (SLAM). Previous works from predecessors have studied the inconsistent problem of extended Kalman filter (EKF) SLAM algorithm focusing on the linearization errors. In this paper, we studied the inconsistency issue of EKF SLAM in theory based on measurement noise and observation time. In a simplified situation, we deduced some useful theorems of estimated covariance matrix. Then, we made use of them to investigate the inconsistency issue. We showed that the measurement noise and the observation times can drive the EKF SLAM out of consistency. Moreover, we demonstrated the explicit effects of measurement noise and observation times on inconsistency of the EKF SLAM. Our simulation experiments verified the results.

关键词 [Simultaneous localization and mapping \(SLAM\)](#) [extended Kalman filter \(EKF\)](#) [consistency](#) [measurement noise](#) [observation times](#)

分类号

Consistency Analysis of EKF-based SLAM by Measurement Noise and Observation Times

LI Hui-Ping, XU De-Min, ZHANG Fu-Bin, YAO Yao

1. College of Marine Engineering, Northwestern Polytechnical University, Xi'an 710072, P.R. China

Abstract

Inconsistency is a fundamental problem in simultaneous localization and mapping (SLAM). Previous works from predecessors have studied the inconsistent problem of extended Kalman filter (EKF) SLAM algorithm focusing on the linearization errors. In this paper, we studied the inconsistency issue of EKF SLAM in theory based on measurement noise and observation time. In a simplified situation, we deduced some useful theorems of estimated covariance matrix. Then, we made use of them to investigate the inconsistency issue. We showed that the measurement noise and the observation times can drive the EKF SLAM out of consistency. Moreover, we demonstrated the explicit effects of measurement noise and observation times on inconsistency of the EKF SLAM. Our simulation experiments verified the results.

Key words [Simultaneous localization and mapping \(SLAM\)](#) [extended Kalman filter \(EKF\)](#) [consistency](#) [measurement noise](#) [observation times](#)

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通讯作者 李慧平 888.li.mmm@163.com

作者个人主页 李慧平; 徐德民; 张福斌; 姚尧

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