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人工神经网络改进的AHRS/GPS 紧耦合滤波算法 (PDF)

Title: Artificial Neural Network Filter Algorithm Improvement for Tightly‑coupled AHRS/GPS

作者: 夏琳琳; 王建国; 张利辉; 谷丽君

东北电力大学自动化工程学院，吉林吉林 132012

Author(s): XIA Linlin; WANG Jianguo; ZHANG Lihui; GU Lijun

School of Automation Engineering， Northeast Dianli University， Jili n Jilin 132012， China

关键词: AHRS/GPS; 人工神经网络; 伪距伪距率航向角; 紧耦合; 径向基函数

Keywords: AHRS/GPS; ANN; pseudo range‑pseudo‑range rate‑heading angle; tig htly‑coupled; radial basis funiction

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摘要: 以陆用AHRS/GPS紧耦合系统为研究对象，建立了基于伪距伪距率航向角的组合观测数学模型， 采用RBF网络辅助的EKF导航滤波器，逼近组合系统的非线性特性，实现自适应的导航参数解算。仿真结 果表明:方法可快速、准确地逼近系统非线性模型，估算的姿态角误差均方差较标准EKF 减小了约5.9%～ 22.8%。在传感器精度有限的情况下，所获得的导航精度和动态性能均有提高。

Abstract: The parameter model for land vehicular tightly‑coupled AHRS /GPS was built based on fusing pseudo range pseudo‑pseudo range rate‑heading angle. The radial basis function （RBF） NN aided EKF was designed to approach the nonlinearity of the integrated system， realizing the adaptive esti mation for navigation parameters. The simulation indi‑cates the nonlinear model can be approached with high accuracy and rapidity， the RMS of attitude error is decreased by 5.9%～22.8% compared with standard EKF. The accuracy and dynamic per formance are all improved as expected un‑der limited sensor accuracy.

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