

组合导航中低成本磁航向系统的神经网络补偿

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摘要:

根据组合导航的特点, 设计了低成本磁航向系统神经网络补偿方法。研究了磁航向系统的误差和补偿技术; 在全球定位系统信号良好情况下, 以捷联惯导/全球定位组合导航系统的航向信息为参考, 使用卡尔曼滤波作为学习算法, 建立多层前向神经网络模型补偿磁航向系统。实验结果表明, 神经网络补偿方法将磁航向系统的航向角误差由 $\pm 15^\circ$ 减小到约 $\pm 1^\circ$, 取得了明显的效果。

关键词: 组合导航; 磁航向系统; 神经网络; 卡尔曼滤波

Neural Network Compensation for Low-Cost Magnetic Heading System in Integrated Navigation

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Abstract:

According to the characters of integrated navigation, a neural network is designed to compensate the error of a low-cost magnetic heading system(MHS). The error sources of MHS are studied and the compensation methods are analyzed. When the Global Positioning System(GPS) is available, a multilayer feedforward neural network is designed to compensate MHS with the learning method of kalman filter and the reference of strapdown inertial navigation system(SINS)/GPS integrated navigation result. Experiment results show that the neural network can make a significant effect and reduce the heading error of MHS from $\pm 15^\circ$ to $\pm 1^\circ$.

Keywords: integrated navigation; magnetic heading system; neural network; kalman filter

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