

控制理论与实践

基于Elman网络结构的惯导平台漂移模型辨识方法

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摘要:

针对惯性导航平台漂移误差高阶非线性动态系统的特点, 利用神经网络的任意逼近能力和自适应抽取系统动态信息的能力, 提出基于Elman网络结构的惯性导航平台漂移模型辨识方案。首先建立惯性导航平台漂移误差模型, 并选择了用于网络辨识的输入、输出量。采用动量及可变学习速率算法加速网络的收敛; 在该算法的基础上, 针对网络隐层, 提出的扩展非线性节点函数能更好地改善网络学习效率, 满足系统辨识实时性和精确性的需要。通过测得的惯性导航平台漂移误差数据对网络进行训练, 获得了较为满意的辨识结果。

关键词: 惯导平台 漂移模型辨识 Elman网络 速率算法 扩展节点函数

Drift model identification methods for inertial platform based on Elman network

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Abstract:

The characteristic of the drift error of inertial platform is a high order nonlinear dynamic system using the neural networks' abilities of universal approximation of differentiable trajectory and capturing system dynamic information, the drift error identifying project of inertial platform is presented based on Elman networks structure. First, the drift error model of inertial platform is established, and after selecting the input and output for network, momentum and alterable speed algorithm is used to speed up the network convergence. On the basis of the algorithm, the extended nonlinear node function in the hidden network not only improves the learning speed of network, but also satisfies the need of accuracy on system identification. Through the drift error data measured on inertial platform the training shows that the scheme achieves a relatively satisfying identification result.

Keywords: platform inertial drift model identification Elman network speed algorithm extended node function

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