

基于GA-BP神经网络的UUV航向容错控制

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摘要：

为提高UUV航向控制系统的可靠性，本文对传统的BP神经网络利用遗传算法进行了优化设计，并将优化的BP神经网络应用于改进的二阶灰色预测模型对光纤罗经进行故障诊断，若UUV罗经故障，根据UUV当前的舵角、航速与加速度信息重构航向信息航向输出，实现对光纤罗经的航向容错控制。本文详细阐述了容错控制方法的实现步骤，并利用海试实验数据进行了仿真验证，准确的诊断出光纤罗经的故障，并能较好的实现光纤罗经的航向容错。

关键词：UUV；GM(2,1)；GA-BP神经网络；故障诊断；容错控制

Heading Fault-tolerant Control for UUV Based on GA-BP neural network

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Abstract:

To improve the reliability of UUV heading control system, BP neural network was improved by Genetic Algorithm and applied in the Improved GM(2,1) model is applied to diagnosis the fault of fiber compass. While the fiber compass fault, the improved BP neural network data based on the current rudder angle, velocity and acceleration message. The heading fault-tolerant of fiber compass realized with the output of fiber compass. The manipulate steps of fault-tolerant control is described in detail, and the method has been simulated methods proposed can diagnose the faults quickly and accurately and can achieve the fault-tolerant of fiber compass well.

Keywords: UUV; GM(2,1); GA-BP neural network; fault diagnosis; fault-tolerant control

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