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论文

欠驱动AUV模糊神经网络L2增益鲁棒跟踪控制

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摘要：

提出基于模糊神经网络欠驱动水下自主机器人(AUV) 的??2 增益鲁棒跟踪控制方法, 该方法通过在线学习逼近动力学模型的不确定项. 控制器克服了由于缺少横向推力对跟踪误差的影响, 在考虑未知海流干扰情况下, 实现了系统对模糊神经网络逼近误差的??2 增益小于??. 利用Lyapunov 稳定性理论证明了闭环控制系统误差信号一致最终有界. 最后, 通过精确模型参数和参数扰动仿真实验验证了该控制方法具有很好的跟踪效果和较强的鲁棒性.

关键词： 关键词：欠驱动AUV 路径跟随 模糊神经网络 L2增益

FNN-based L2 following control of underactuated autonomous underwater vehicles

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Abstract:

The ??2 gain robust following control method based on fuzzy neural networks for underactuated autonomous
underwater vehicles(AUV) is proposed. The proposed control method can be used to approximate the uncertainty of the dynamic model through the online adaptive learning algorithm. The controller can overcome the influence on following errors of missing sway force. The unknown ocean current disturbance of three degrees of freedom is considered. It is realized that the ??2 gain of fuzzy neural network approximation errors is less than ??. The uniform ultimate boundedness of closed loop system error signals is proved by using Lyapunov stability theory. Finally, simulation experiments with the precise system parameters and parameters perturbation are given, and the results show the good following result and the strong robustness of the proposed control method.

Keywords: underactuated AUV path following fuzzy neural networks L2 gain

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