

论文与报告

基于观测器的机械手神经网络自适应控制

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摘要

提出了一种基于观测器的机械手神经网络自适应轨迹跟随控制器设计方法,这里机械手的动力学非线性假设是未知的,并且假设机械手仅有关节角位置测量.文中采用一个线性观测器重构机械手的关节角速度,用神经网络逼近修正的机械手动力学非线性,改进系统的跟随性能.基于观测器的神经网络自适应控制器能够保证机械手角跟随误差和观测误差的一致终结有界性以及神经网络权值的有界性,最后给出了机械手神经网络自适应控制器-观测器设计的主要理论结果,并通过数字仿真验证了所提方法的性能.

关键词 [机械手](#) [观测器](#) [神经网络](#) [自适应](#)

分类号

Observer-Based Adaptive Control for Robot Trajectory Tracking Using Neural Networks

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Abstract

An observer-based adaptive controller design approach using neural networks is proposed in this paper for the trajectory tracking of a robot with unknown dynamic nonlinearities, and the robot manipulator is assumed to have only joint angle position measurements. A linear observer is used to estimate the robot joint angle velocity, while the neural network is employed to further improve the control performance of the controlled system through approximating the revised dynamic nonlinearities of the robot. The observer-based neural network controller can guarantee the uniformly ultimately bounded tracking errors and the observer errors and boundedness of the neural network weights. Main theoretic results for designing an adaptive controller-observer for a robot using neural networks are given, and the control performance of the proposed controller is verified through simulation studies.

Key words [Robot manipulator](#) [observer](#) [neural networks](#) [adaptiveness](#)

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