

工程与应用

多关节机器人的神经滑模控制

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摘要 针对含有建模误差和不确定干扰的多关节机械臂轨迹跟踪控制, 提出了一种神经滑模控制方法。该方法采用全局快速终端滑模面保证了系统状态能够在有限时间内到达滑模面和平衡点。采用径向基函数神经网络自适应地补偿系统的建模误差和外界干扰, 保证了滑模控制在滑模面的运动。利用李亚普诺夫稳定性判据推导出了控制器的控制律和神经网络的目标函数, 通过神经网络的在线学习, 削弱了滑模控制的抖振。仿真结果表明了其有效性。

关键词 [全局快速终端滑模控制](#) [神经网络](#) [建模误差](#) [抖振](#) [滑模面](#)

分类号

Neural sliding mode control for multi-link robots

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Abstract

A neural sliding mode controller is given for trajectory tracking control of multi-link robots with uncertain external disturbances and system model errors. This approach uses a global fast terminal sliding mode manifold, which guarantees that the controlled system can reach the sliding mode manifold and equilibrium point in finite time from any initial state. A Radial Basis Function (RBF) neural network is applied to learn the upper bound of system model errors and external disturbances, and enforce the sliding mode motion. The control law and the cost function of the RBF neural network is calculated by Lyapunov stability method. Chattering of the sliding mode control is reduced, even eliminated without sacrificing its robustness by the RBF neural network's learning. Simulation results verify the validity of the control scheme.

Key words [global fast terminal sliding mode control](#) [neural network](#) [model error](#) [chattering](#) [sliding mode manifold](#)

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