應用動態結構模糊神經網路於機械臂適應控制研究

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摘 要

機械手臂為高度非線性系統，並且需要承受系統參數的變動和外力的干擾，因此，本文將提出一動態結構模糊類神經網路(Dynamic Structure Neural-Fuzzy Networks)控制系統於機械臂系統之軌跡跟隨。首先使用類神經模糊網路系統學習機械臂之未知動態，並以此類神經模糊網路系統設計出強健的控制器，此類神經模糊網路可以線上調整網路的參數與結構以得到最佳的近似效果。再依據里阿普諾夫(Lyapunov)的穩定法則，我們發展一混合式控制器(hybrid controller)，其設計一個調節函數來切換自適應性控制器與順滑控制器來確保整個控制系統的穩定及收斂。硬體方面，以個人電腦為基礎，並結合研華的PCI-1784 Encoder卡和PCI-1720U D/A卡，並應用Borland C++ Builder 6.0來撰寫系統的控制軟體。最後以一實際的兩軸機械臂，透過各種實驗，來驗證本文所提方法的有效性。

關鍵詞 : 類神經模糊網路、機械臂控制、非線性系統、適應性控制

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