應用類神經網路於PID控制器之設計研究

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摘 要

本論文以類神經網路之架構為基礎，首先探討倒傳遞神經網路 在函數近似之模擬應用，文中採用最陡坡降法(Steepest descent method)、最陡坡降加慣量法(Steepest descent with momentum)、最 速恢復倒傳遞法(Resilient backpropagation)、共軛梯度法(Conjugate gradient method)、BFGS 擬牛頓法(BFGS quasi-Newton method)與 LM 法(Levenberg-Marquardt method)等六種學習方法，以比較不同 學習法則在函數近似之能力，同時也探討其對神經網路訓練之收斂 速度與均方差之影響等。除此之外，隱藏層神經元數對函數近似之 影響，也被提出討論，並給予適當建議。 本論文同時將類神經網路應用於PID控制器之離線(Off-line) 參數調整。首先利用控制系統輸出之誤差值與追蹤信號做為類神經 網路之輸入值與學習目標值，以做為調整PID 控制器參數之依據。 PID 控制器參數之調整則以輸出誤差為調整權重，透過迭代計算至 滿足均方誤差設定值

關鍵詞 : 倒傳遞類神經網路、函數近似，自調式PID 控制器

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