# Intelligent position control for a linear ceramic motor using a self-constructing neural network

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## Abstract

In this paper, an intelligent position control (IPC) is developed for a linear ceramic motor (LCM) drive system. The IPC system is comprised of a neural controller and a robust controller. The neural controller utilizes a self-constructing neural network (SCNN) to mimic an ideal computation controller, and the robust controller is designed to achieve tracking performance with a desired attenuation level. If the approximation performance of the SCNN is not good enough, the SCNN can create new hidden neurons to increase the learning ability. If the hidden neuron of the SCNN is insignificant, it should be removed to reduce the computation load; otherwise, if the hidden neuron of the SCNN is significant, it should be retained. Moreover, the adaptive laws of controller parameters are derived in the sense of Lyapunov, so that the system stability can be guaranteed. Finally, the experimental results of the LCM drive system show that a perfect tracking response can be achieved by using the self-constructing mechanism and the on-line learning algorithm.

Keyword：Adaptive control, neural network control, self-structuring, linear ceramic motor