Chapter 1

Ultra High Frequency Polynomial and Trigonometric Higher Order Neural Networks for Control Signal Generator

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ABSTRACT

This chapter develops a new nonlinear model, Ultra high frequency Polynomial and Trigonometric Higher Order Neural Networks (UPT-HONN), for control signal generator. UPT-HONN includes UPS-HONN (Ultra high frequency Polynomial and Sine function Higher Order Neural Networks) and UPC-HONN (Ultra high frequency Polynomial and Cosine function Higher Order Neural Networks). UPS-HONN and UPC-HONN model learning algorithms are developed in this chapter. UPS-HONN and UPC-HONN models are used to build nonlinear control signal generator. Test results show that UPS-HONN and UPC-HONN models are better than other Polynomial Higher Order Neural Network (PHONN) and Trigonometric Higher Order Neural Network (THONN) models, since UPS-HONN and UPC-HONN models can generate control signals with error approaching 0.0000%.

INTRODUCTION

The perspective of this chapter will be: introduce the background of HONNs with the applications of HONNs in control area; develop a new HONN model called UPT-HONN for ultra-high frequency control signal generator; provide the UPT-HONN learning algorithm and weight update formulae; applications of UPT-HONN model for control signals.

This chapter is organized as follows: Section background gives the background knowledge of HONNs in control area. Section UPT-HONN models introduces UPT-HONN structure and different modes of the UPT-HONN model. Section learning algorithm of UPT-HONN models provides the UPT-HONN model update formula, learning algorithms, and convergence theories of HONN. Section UPT-HONN testing describes UPT-HONN computer software system and testing results.

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BACKGROUND

Neural Networks for Control Signals and Control Systems


Higher Order Neural Networks for Control Signals and Control Systems

Artificial Higher Order Neural Networks (HONNs) have been widely used in the control area too. Studies also found that artificial higher order neural networks are good tools for system control and generating