

CHAOS 2009

2nd Chaotic Modeling and Simulation International Conference

June 1 - 5, 2009 Chania Crete Greece

www.chaos2009.net

Weight Tracking in Nonlinear System Identification via Fuzzy High Order Neural Network Function Approximation

Manolis A. Christodoulou*, Dimitris C. Theodoridis**, Yiannis A. Boutalis**

*Department of Electronic and Computer Engineering, Technical University of Crete, Chania, Crete, **Department of Electrical and Computer Engineering, Democritus University of Thrace Xanthi, GREECE

manolis@ece.tuc.gr, dtheodo@ee.duth.gr, ybout@ee.duth.gr

The weight tracking in the identification of varying unknown nonlinear systems is examined in this paper. The unknown nonlinear system is represented and identified by an Adaptive Dynamic Fuzzy Systems (ADFS), which operates in conjunction with High Order Neural Network Functions (HONNFs) and takes the form of a Fuzzy Recurrent High Order Neural Network (F-RHONN). Weight updating laws for the involved HONNFs are given, which guarantee that the identification error reaches zero exponentially fast. The proposed scheme has the ability to track very fast any change in the unknown nonlinear system, that can be reflected in weight changes of its F-RHONN representation. Simulations illustrate the potency of the method especially in tracking the changes made in the unknown system.