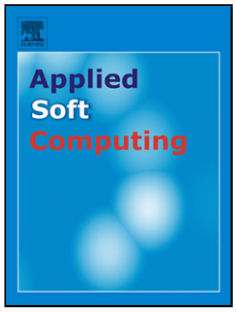

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Author: Haiquan Zhao Xiangping Zeng Zhengyou He Zheng Cao Shujian Yu Badong Chen

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Improved functional link artificial neural network via convex combination for nonlinear active noise control

Haiquan Zhao*, Xiangping Zeng, Zhengyou He, Zheng Cao, Shujian Yu and Badong Chen

Abstract: A method relying on the convex combination of two normalized filtered-s least mean square algorithms (CNFSLMS) is presented for nonlinear active noise control (ANC) systems with a linear secondary path (LSP) and nonlinear secondary path (NSP) in this paper. The proposed CNFSLMS algorithm-based functional link artificial neural network (FLANN) filter, aiming to overcome the compromise between convergence speed and steady state mean square error of the NFSLMS algorithm, offers both fast convergence rate and low steady state error. Furthermore, by replacing the sigmoid function with the modified Versorial function, the modified CNFSLMS (MCNFSLMS) algorithm with low computational complexity is also presented. Experimental results illustrate that the combination scheme can behave as well as the best component and even better. Moreover, the MCNFSLMS algorithm requires less computational complexity than the CNFSLMS while keeping the same filtering performance.

Keywords: Functional link artificial neural network, Active noise control, Filtered-s LMS algorithm, Adaptive combination

1. Introduction

Over the past decades, active noise control (ANC), which is based on the superposition principle that a noise can be canceled by another noise with the same amplitude but opposite in phase, has attracted increasing attention because of its potential use in low frequency noise control applications [1]. One of the most popular adaptive filtering algorithms is the filtered-x

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H. Zhao and Z. He are with the Key Laboratory of Magnetic Suspension Technology and Maglev Vehicle, Ministry of Education, Southwest Jiaotong University, Chengdu, 610031, China.

H. Zhao and Z. He are also with the School of Electrical Engineering, Southwest Jiaotong University, Chengdu, 610031, China. E-mail addresses: hqzhao@home.swjtu.edu.cn. X. Zeng is with Chengdu University of Information Technology, Chengdu, 610225, China.

Z. Cao and S. Yu are with the Department of Electrical and Computer Engineering, University of Florida, Gainesville, USA.

B. Chen is with the School of Electrical and Information Engineering, Xi'an Jiaotong University, Xi'an, China

*Corresponding author.