World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:11, No:12, 2017

Optimization Approach to Estimate Hammerstein–Wiener Nonlinear Blocks in Presence of Noise and Disturbance

Authors : Leili Esmaeilani, Jafar Ghaisari, Mohsen Ahmadian

Abstract : Hammerstein–Wiener model is a block-oriented model where a linear dynamic system is surrounded by two static nonlinearities at its input and output and could be used to model various processes. This paper contains an optimization approach method for analysing the problem of Hammerstein–Wiener systems identification. The method relies on reformulate the identification problem; solve it as constraint quadratic problem and analysing its solutions. During the formulation of the problem, effects of adding noise to both input and output signals of nonlinear blocks and disturbance to linear block, in the emerged equations are discussed. Additionally, the possible parametric form of matrix operations to reduce the equation size is presented. To analyse the possible solutions to the mentioned system of equations, a method to reduce the difference between the number of equations and number of unknown variables by formulate and importing existing knowledge about nonlinear functions is presented. Obtained equations are applied to an instance H–W system to validate the results and illustrate the proposed method.

Keywords : identification, Hammerstein-Wiener, optimization, quantization
Conference Title : ICCSE 2017 : International Conference on Control Systems and Engineering
Conference Location : Paris, France
Conference Dates : December 28-29, 2017

Open Science Index, Electrical and Computer Engineering Vol:11, No:12, 2017 publications.waset.org/abstracts/80222.pdf