

Identification of Continuous-time Hammerstein System using Sine Cosine Algorithm

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Abstract:

This paper presents the development of identification of continuous-time Hammerstein systems based on Sine Cosine Algorithm (SCA). Here, the structure of the nonlinear subsystem is assumed to be unknown, while the structure of the linear subsystem which is the system order assumed to be available. The SCA based method is then used to estimate the parameters in both the linear and nonlinear parts based on the given input and output data. Two numerical examples are given to illustrate the effectiveness of the SCA based algorithm. A continuous-time Infinite Impulse Response (IIR) filter is considered in the linear part, while the nonlinear functions, such as quadratic and hyperbolic are considered in the nonlinear part. The analysis of the numerical results is observed in terms of the parameter identification error, the convergence curve of the objective function, the output response in the time domain and the linear system response in the frequency domain. The results show that the potential of SCA based algorithm in giving an accurate parameter estimation of the Hammerstein models, especially for low noise level.

Keywords: Hammerstein System; Sine Cosine Algorithm.

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