

## **Design of morlet wavelet neural network for solving a class of singular pantograph nonlinear differential models**

### **ABSTRACT**

The aim of this study is to design a layer structure of feed-forward artificial neural networks using the Morlet wavelet activation function for solving a class of pantograph differential Lane-Emden models. The Lane-Emden pantograph differential equation is one of the important kind of singular functional differential model. The numerical solutions of the singular pantograph differential model are presented by the approximation capability of the Morlet wavelet neural networks (MWNNs) accomplished with the strength of global and local search terminologies of genetic algorithm (GA) and interior-point algorithm (IPA), i.e., MWNN-GAIPA. Three different problems of the singular pantograph differential models have been numerically solved by using the optimization procedures of MWNN-GAIPA. The correctness of the designed MWNN-GAIPA is observed by comparing the obtained results with the exact solutions. The analysis for 3, 6 and 60 neurons are also presented to check the stability and performance of the designed scheme. Moreover, different statistical analysis using forty number of trials is presented to check the convergence and accuracy of the proposed MWNN-GAIPA scheme.