Evolutionary integrated heuristic with gudermannian neural networks for second kind of lane–emden nonlinear singular models

ABSTRACT

In this work, a new heuristic computing design is presented with an artificial intelligence approach to exploit the models with feed-forward (FF) Gudermannian neural networks (GNN) accomplished with global search capability of genetic algorithms (GA) combined with local convergence aptitude of active-set method (ASM), i.e., FF-GNN-GAASM to solve the second kind of Lane–Emden nonlinear singular models (LE-NSM). The proposed method based on the computing intelligent Gudermannian kernel is incorporated with the hidden layer configuration of FF-GNN models of differential operatives of the LE-NSM, which are arbitrarily associated with presenting an error-based objective function that is used to optimize by the hybrid heuristics of GAASM. Three LE-NSM-based examples are numerically solved to authenticate the effectiveness, accurateness, and efficiency of the suggested FF-GNN-GAASM. The reliability of the scheme via statistical valuations is verified in order to authenticate the stability, accuracy, and convergence.