The Neural Network Method for Solving Lane–Emden Equation with Chebyshev Polynomials of Second Kind

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Abstract

The objective of this paper is to present two effective computational schemes for solving Lane–Emden-type equations using an artificial neural network. The specified neural network consists of three layers: the input layer, the hidden layer, and the output layer. For the activation functions of the hidden layer, we consider Chebyshev polynomials of the second kind. Also, we consider another activation function for the output layer. Finally, for train, this neural network, collocation method and classical optimization method are applied. The applicability and accuracy of the expressed technique are investigated in three illustrative examples.

Keywords: Neural network, Lane–Emden equation, and Chebyshev polynomials of second kind

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