Adaptive levy flight distribution algorithm for solving a dynamic model of an electric heater

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ABSTRACT

This paper presents an improved version of Levy Flight Distribution (LFD) algorithm. The original LFD is formulated based on the random walk strategy. However, it suffers a premature convergence due to imbalance exploration and exploitation. Consequently, the algorithm produces unsatisfactory performance in terms of its final accuracy achievement. As a solution to the problem, an adaptive scheme of search agents step size is incorporated into the original LFD algorithm. Moreover, a mating strategy is also adopted to improve its stochastic nature throughout the search process. The algorithm is applied to optimize a nonlinear dynamic model of an electric water heater. A fuzzy-based Hammerstein structure is adopted to represent the heater model. It comprises a combination of both linear and nonlinear equations so that it can capture the dynamic behavior of the heater satisfactorily. The proposed adaptive LFD algorithm is compared with the original LFD algorithm. The result shows that the proposed algorithm has attained a better accuracy. It also has captured the dynamic behavior of the heater more adequately.

KEYWORDS

Adaptive levy flight distribution; Dynamic modelling; Electric water heater; Fuzzy Hammerstein

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