Adaptive-somersault mrfo for global optimization with an application to optimize PD control

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ABSTRACT

This paper presents an Adaptive-Somersault Manta Ray Foraging Algorithm (AS-MRFO). Manta Ray Foraging Algorithm (MRFO) is a recently introduced algorithm inspired from Manta Ray Foraging strategy. MRFO is proven as a good performance optimization algorithm in finding a theoretical optima solution of various optimization benchmark functions. It has a considerable high accuracy performance as compared with other state-of-the-art algorithms. In this work, an adaptive position update sine-based formula is adopted into the original MRFO as a strategy to improve its exploration and exploitation strategies. The proposed algorithm is tested on Evolutionary benchmark functions (CEC) to show its accuracy performance. It is also applied to optimize Proportional-Derivative (PD) control for a flexible manipulator system. Result of the performance test shows that the proposed adaptive algorithm has significantly outperformed the accuracy of the original MRFO. The application of the algorithm to optimize the PD control shows that the control scheme optimized by the proposed adaptive-somersault algorithm has attained a better control performance.

KEYWORDS

Manta ray foraging algorithm; Adaptive-somersault; Spiral-based algorithm; PD control; Flexible manipulator

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