

# Adaptive Sine-Cosine Algorithms for global optimization

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## **Abstract**

This paper introduces improved versions of a Sine-Cosine algorithm called Adaptive Sine-Cosine algorithms. It is made adaptive through incorporation of a linear and an exponential term with respect to an individual agent's fitness. Based on the newly introduced formulas, an individual agent moves with a dynamic and different step sizes compared to other agents through the whole searching process. It also introduces a balance exploration and exploitation strategies. The proposed algorithms in comparison to the original algorithm are then tested with several test functions that have different properties and landscapes. The algorithms performance in terms of their achievement of finding a near optimal solution is analyzed and discussed. Numerical result of the test shows that the proposed algorithms have achieved a better accuracy. The finding also shows that the proposed algorithms have attained a faster convergence toward the near optimal solution.

**Keywords:** adaptive sine-cosine, optimization algorithm, exponential adaptive, linear adaptive.