Hybrid Sine-Spiral Dynamic Algorithm for Dynamic Modelling of a Flexible Manipulator

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Abstract:
This paper presents a newly developed algorithm formulated based on a synergy between a mathematical sine equation and a spiral equation. The sine formula is taken from Sine-Cosine Algorithm (SCA) while the spiral equation is adopted from Spiral Dynamic Algorithm (SDA). The synergy combines a deterministic approach from SDA and a random approach from SCA. In the hybrid strategy, all agents update their position either via sine based or spiral based position update equation. The proposed hybrid algorithm is tested in comparison to SDA and SCA on various benchmark functions. A convergence plot and accuracy achievement are recorded and compared. In term of a real world application, the algorithm is applied to optimize a parametric model of an end point acceleration of a flexible manipulator robot. Result of the benchmark functions test shows that the proposed algorithm significantly improves the accuracy of both SCA and SDA. Result of the modelling shows that the SCA, SDA and the proposed algorithm have successfully modelled the end point acceleration.

Keywords: Hybrid Algorithm; Sine; Spiral Dynamic Algorithm; Flexible Manipulator.

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