A Novel Adaptive Spiral Dynamic Algorithm for Global Optimization

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***Abstract*— This paper presents a novel adaptive spiral dynamic algorithm for global optimization. Through a spiral model, spiral dynamic algorithm has a balanced exploration and exploitation strategy. Defining suitable value for the radius and displacement in its spiral model may lead the algorithm to converge with high speed. The dynamic step size produced by the model also allows the algorithm to avoid oscillation around the optimum point. However, for high dimension problems, the algorithm may easily get trapped into local optima. This is due to the incorporation of a constant radius and displacement in the model. In order to solve the problem, a novel adaptive formulation is proposed in this paper by varying the radius and displacement of the spiral model. The proposed algorithm is validated with various dimensions of unimodal and multimodal benchmark functions. Furthermore, it is applied to parameter optimization of an autoregressive with exogenous terms dynamic model of a flexible manipulator system. Comparison with the original spiral dynamic algorithm shows that the proposed algorithm has better accuracy. Moreover, the time domain and frequency domain responses of the flexible manipulator model shows that the proposed algorithm outperforms its predecessor algorithm.**

Keywords*— *Metaheuristic algorithm, adaptive spiral dynamic, ARX dynamic model, flexible manipulator.

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