

基于多目标飞蛾优化算法的自抗扰参数整定研究

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摘要: 本文提出了一种基于多目标飞蛾优化算法的自抗扰控制器参数优化设计方法.针对多目标优化算法在优化过程中的早熟收敛甚至陷入局部极小值的问题,采用夹角余弦判别权重向量的邻域,对目标空间进行有效的分解,并以精英机制以存储优化过程中的非支配解,利用融合距离对精英集进行维护,保证了种群的多样性;最后以机械臂作为实验算例进行仿真验证,验证了多目标飞蛾优化算法的有效性,可以用于自抗扰控制器的参数整定.

关键词: 非线性自抗扰; 参数整定; 融合距离; 飞蛾优化算法; 夹角余弦; 机械臂

Research on Auto Disturbance Rejection Parameter Tuning Based on Multi Target Moth Optimization Algorithm

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Abstract: This paper presents a parameter optimization design method of ADRC controller based on multi-objective Moth-flame optimization algorithm. Aiming at the problem of premature convergence and even falling into local optimal in optimization process, the angle cosine is used to judge the neighborhood of weight vector which can effectively decompose the target space. Besides, the elite mechanism is added to store non-dominated solutions during the optimization process. The fusion distance is calculated to maintain the elite set and ensure the diversity of the population. Finally, the robot arm as an experimental example of simulation to verify the effectiveness of multi-objective moth optimization algorithm and it can be used for anti-interference controller parameter tuning.

Key words: nonlinear auto disturbance rejection; parameter tuning; confluent distance; moth-flame optimization; angle cosine;

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