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"Gheorghe Asachi" Technical University of Iasi, Romania

A MULTI-OBJECTIVE PARTICLE SWARM OPTIMIZATION ALGORITHM BASED ON HUMAN SOCIAL BEHAVIOR FOR ENVIRONMENTAL ECONOMICS DISPATCH PROBLEMS

Daqing Wu[1, 2, 3*], Yanli Liu[1], KaigeZhou[4], Kang Li[5], Jiao Li[6]

[1]College of Economics and Management, Shanghai Ocean University, Shanghai 201306, China
[2]Computer Institute, University of South China, Hengyang 421001 China
[3]School of Economics & Management, TongJi University, Shanghai 20092, China
[4]Department of Economics and Management, Huaiyin Normal University, Huai'an 223001,China
[5]School of Business Administration, Shanghai Lixin University of Accounting and Finance, Shanghai 201620, China
[6]Microelectronics R&D Center, Shanghai University, Shanghai 200444, China

Abstract

Due to emissions from power station using fossil fuels, the decrease of existing pollution as well as of operational costs should be taken into consideration, when resolving environmental economic dispatch problems. In this research, we will evidence that nonlinear constraints of generating units, forbidden regions, and ramp-rate of generating units will reduce operational costs and environmental pollution, to achieve environmental economic dispatch effectiveness, by employing an improved multi-objective optimization algorithm based on human social behavior. With reward and penalty learning factors leading to excellent particles matting and optimization capability to achieve optimal solution, data transactions among particles have been conducted in the suggested approach. To get a more effective comparable result from the recommended algorithm, we conducted simulation experiments on IEEE 10-bus power systems in different load levels. Then we compared the outcomes with those other algorithms that were validated. The results show that the proposed algorithm can achieve diverse Pareto optimal solutions, fast convergence and high robustness, and unlikely to be trapped in local minima. It is revealed that the proposed technique is superior in terms of accuracy and speed in solving power system complex problems over the other methods.

Key words: economic dispatch, human social behaviour, multi-objective optimization problem, particle swarm optimization

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* Author to whom all correspondence should be addressed: e-mail: dqwu@shou.edu.cn; Phone: +86-21-6190-0856