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Abstract

In a deregulated electricity market, the aim of generating companies (GENCOs) is to maximize their profit by bidding optimally in the day-ahead market, under incomplete information of the competitors. This paper proposes a methodology to acquire the optimal bidding strategy of thermal GENCO in a uniform price spot market as a precise model of nonlinear operating cost function and minimum up/down constraints of unit commitment. Rivals bidding behavior is described using different probability distribution functions: normal, lognormal, gamma and weibull probability distribution function. Bidding strategy of a generator for each trading period in a day-ahead market is solved by whale optimization algorithm (WOA). WOA can dynamically monitor the repeatedly varying market demand and supply in each trading interval. This paper explores the effectiveness of the proposed algorithm with different probability functions to obtain optimal bid quantities and prices and compare the results.

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Index Terms

Computer Science

Algorithms

Keywords

Electricity market, bidding strategies, whale optimization algorithm (WOA), Monte Carlo (MC) simulation, probability distribution