

## Optimal generation for wind-thermal power plant systems with multiple fuel sources

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### Article Info

#### Article history:

Received May 29, 2020

Revised Sep 10, 2020

Accepted Oct 7, 2020

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#### Keywords:

Cuckoo search algorithm

Multiple fuel sources

Thermal power plant

Total fossil fuel cost

Wind power plant

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### ABSTRACT

In this paper, the combined wind and thermal power plant systems are operated optimally to reduce the total fossil fuel cost (TFFC) of all thermal power plants and supply enough power energy to loads. The objective of reducing TFFC is implemented by using antlion algorithm (ALA), particle swarm optimization (PSO) and Cuckoo search algorithm (CSA). The best method is then determined based on the obtained TFFC from the three methods as dealing with two study cases. Two systems with eleven units including one wind power plant (WPP) and ten thermal power plants are optimally operated. The two systems have the same characteristic of MFSs but the valve loading effects (VLEs) on thermal power plants are only considered in the second system. The comparisons of TFFC from the two systems indicate that CSA is more powerful than ALA and PSO. Furthermore, CSA is also superior to the two methods in terms of faster search process. Consequently, CSA is a powerful method for the problem of optimal generation for wind-thermal power plant systems with consideration of MFSs from thermal power plants.

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## 1. INTRODUCTION

The main text format consists of a flat left-right columns on A4 paper (quarto). The margin text from the In power system operation, the main target of operating thermal power plants (TPPs) is to determine the most appropriate active power generation of each thermal power plant (TPP) to reduce TFFC as much as possible [1-3]. The fact that fossil fuel sources (FFSs) will be exhausted in future and its cost will increase. So, the optimal use plan of the fuels can enable to last the use time of the sources and power system will be more stable and work with high reliability. The purpose of using FFSs with lower cost and long time is encouraged in power systems [4, 5].

The problem of minimizing TFFC from TPPs was concerned in many recent decays. This problem was called economic load dispatch (ELD) and mathematical modeled by the presence of objective function and constraints such as limits of generation and active power balance [6-8]. Some first ELD problems