A Matheuristic for a Unit Commitment Problem[*]

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We consider a modification of unit commitment problem presented in [2]. It aims to minimize the total operational cost of the electric power system by determining the set of generating units in use and the amount of energy production of the chosen generating units in each period of a planning horizon. The schedule must meet a number of specific constraints such as technical parameters of each individual generator, regulatory requirements of the power system etc.

The unit commitment problem is of great practical importance and has received a significant attention in the literature. Most of the solution approaches for this problem rely on dynamic programming techniques, Lagrangian relaxations, ordering heuristics, and metaheuristics. The methods based on the mathematical programming become more and more capable as the MIP optimization software and computers rapidly progress. A development of that kind of methods is perspective even for the large-scale instances [1].

In the practice of Russian Unified Power System, several hundreds of generating units are to be scheduled over the planning horizon of 72 one-hour periods. We propose a heuristic method based on the mathematical programming techniques (a matheuristic) to deal with instances of that dimensionality and carry out numerical experiments with data featuring the real-life structure to evaluate its performance.

References

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