What metaheuristic solves the economic dispatch faster? A comparative case study

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Abstract— The economic dispatch (ED) is one of the most important short-term problems in power systems, and solving it quickly is essential. However, classical optimization tools are often too computationally demanding to be considered satisfactory. This has motivated the application of metaheuristic methods, which offer a good compromise in terms of solution quality and computation time. However, these methods have been applied in an isolated way and on different problem definitions and case studies, so that there were no clear insights on how they compared to each other. This paper fills this gap by performing an objective comparison of six metaheuristics solving the ED in several case studies under different conditions. Although mixed-integer programming performs best for small case studies, our results confirm that metaheuristics are able to efficiently solve the ED problem. Genetic algorithms emerge as the best performers in terms of solution quality and computation time, followed by PSO and TLBO.

Index Terms— Economic dispatch; Heuristic algorithms; Evolutionary computation; Genetic algorithms; Particle swarm optimization

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