

Integrated Scheduling of Operations and Maintenance for Power Networks with Load Priority: A Metaheuristic Approach

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Abstract

Maintaining a reliable electrical power network is crucial for the national economy, especially in a developing and motivated country. This can be achieved through optimal maintenance and operation (power generation and transmission) of the energy system, including generators and transmissions lines. Furthermore, uninterrupted power supply is essential for certain sectors such as hospitals or industrial zones. This research proposes a mathematical model that can be used to optimize the integrated problem of maintenance and operation of the energy system considering the sufficient power supply to critical units. The objectives are to minimize the total power deficits in the network and the total operation and maintenance cost, while ensuring a reliable power supply to critical units. A matheuristic is developed to deal with large-scale problems. This solution approach combines a genetic algorithm using elitism criteria and the relaxed mathematical model with bounding updates. IEEE data sets are used to test the mathematical model and the Matheuristic. The case study shows the effectiveness of the proposed matheuristic which achieves 100% electrical demand fulfillment for critical units and reduces computational time by about 30%.

Keywords

Maintenance Scheduling, Energy System, Matheuristic, Genetic Algorithm.

Biographies

Vincent F. Yu received the Ph.D. degree in industrial & operations engineering from the University of Michigan, Ann Arbor. He is currently a Professor of Industrial Management at the National Taiwan University of Science and Technology. He had published articles in *Applied Mathematical Modeling*, *Applied Soft Computing*, *Computers & Industrial Engineering*, *Computers & Operations Research*, *European Journal of Operational Research*, *Industrial Marketing Management*, *International Journal of Production Research*, *Journal of Intelligent Manufacturing*, *Omega*, *Renewable and Sustainable Energy Reviews*, *Renewable Energy*, and *Transportation Research Part E: Logistics and Transportation Review*. His current research interests include operations research, logistics management, soft computing, energy system optimization, and artificial intelligence.

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