Abstract

Continuous researching effort to improve the power systems quality problems and to meet the increasing power demand has being done. Hybrid power generation systems (HPGS) considered one from the suggested solutions; these systems are combined from different power sources. Wind turbine (WT), photovoltaic (PV), storage battery (SB), fuel cell (FC), and gas turbine (GT) considered the most common power sources and the main elements of HPGS. There are two main modes for the HPGS; a stand-alone mode and the utility connected mode. This paper presents the optimal design of the HPGS for the two modes, where each mode is discussed for two scenarios, one for the winter and the other for the summer. Modern Meta-heuristic optimizations techniques have been used to keep the results effectiveness and efficiency. Moth-flame optimization (MFO) and multi-verse optimization (MVO) have been used to obtain the optimal design and sizing of the above mentioned power sources. This paper also presents a detailed comparison between the two scenarios for each mode, considering the total
annual cost, emission, and the system reliability are the most important common factors for the
detailed comparison.

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Index Terms

Computer Science

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Keywords

Hybrid generation system, multi-criteria design, renewable energy sources, distributed generation, moth-flame optimization, multi-verse optimization, cuckoo search, flower pollination algorithm.