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1.Most Downloaded

Stochastic energy procurement of large electricity consumer considering photovoltaic, wind-turbine, micro-turbines, energy storage system in the presence of demand response program

Abstract

This paper proposes a stochastic energy procurement problem (SEPP) for large electricity consumer (LEC) with multiple energy procurement sources (EPSs) considering the effects of demand response program (DRP) and energy storage system (ESS). The EPSs contain power market (PM), bilateral contracts (BCs), micro-turbines (MTs), and renewable energy sources (RESs). Moreover, the RESs include photovoltaic (PV) systems and wind-turbines (WT). The ESS and DRP are incorporated in the SEPP by the LEC's decision-maker to reduce the expected energy procurement cost (EEPC). Meanwhile, the uncertainty models of market price, load and RES output power are considered in the SEPP formulation. The error of forecasting of market price, load, temperature and radiation of PV systems are modeled using the normal distribution for generating the related scenarios. Also, the weibull distribution is used to generate variable wind speed scenarios for WT output power uncertainty modeling. Furthermore, the fast forward selection based on Kantorovich distance approach is used for the scenarios reduction.

Finally, the influences of ESS and DRP on EEPC are investigated, and four case studies are used to illustrate the capability of the proposed SEPP. The obtained results demonstrate the efficiency of the proposed stochastic program.

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2. Recent Article

Performances' investigation of different photovoltaic water pumping system configurations for proper matching the optimal location, in desert area

Abstract

The standard sizing methodology of photovoltaic water pumping system is limited only on how to determine at least the number and type of solar panels required for capturing the needed solar energy, by considering the daily water flow and the total dynamic head. However, the feedbacks following different on-site operating tests proved that the lack of information on the geospatial of the area led to unexpected dysfunctions and failure in the system optimality. Accordingly, any deficiency in the comprehensive feasibility study, regarding the specifics of the soil, the climate, groundwater behavior, water demand/supply balance, technique of irrigation and kind of activity, can be the main hindrance to obtain a reliable system. Through this attempt, the field performance suitability of four different photovoltaic water pumping system configurations, namely; (DC/PVPS1), (DC/PVPS2), (DC/PVPS3) and (DC/PVPS4) have been investigated and discussed, according to the Ghardaia land specifics. Based on the characterization data, obtained following the test carried out on the mentioned configurations, at our PV water pumping test facility, the system performances have been assessed, at different pumping head levels ranging from 10 m until 30 m. In the meanwhile, the hydraulic characteristics have been calculated and the corresponding required peak powers have been estimated, for different dust and thermal losses. Thus, upon the geospatial characteristic distribution of the Ghardaia territory, each system configuration has been optimally matched to the suitable location. The adopted methodology can be an efficient tool to select technically and economically the appropriate system to the suitable area.

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3. Most Cited

Optimal power flow using gravitational search algorithm

Abstract

In this paper, gravitational search algorithm (GSA) is proposed to find the optimal solution for optimal power flow (OPF) problem in a power system. The proposed approach is applied to determine the optimal settings of control variables of the OPF problem. The performance of the proposed approach examined and tested on the standard IEEE 30-bus and 57-bus test systems with different objective functions and is compared to other heuristic methods reported in the literature recently. Simulation results obtained from the proposed GSA approach indicate that GSA provides effective and robust high-quality solution for the OPF problem.

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4.Open Access Article

مقالات زیر بصورت کامل قابل دریافت و درصورت تمایل قابل ترجمه می باشند

Dynamic equation-based thermo-hydraulic pipe model for district heating and cooling systems

Abstract

Simulation and optimisation of district heating and cooling networks requires efficient and realistic models of the individual network elements in order to correctly represent heat losses or gains, temperature propagation and pressure drops. Due to more recent thermal networks incorporating meshing decentralised heat and cold sources, the system often has to deal with variable temperatures and mass flow rates, with flow reversal occurring more frequently. This paper presents the mathematical derivation and software implementation in Modelica of a thermo-hydraulic model for thermal networks that meets the above requirements and compares it to both experimental data and a commonly used model. Good correspondence between experimental data from a controlled test set-up and simulations using the presented model was

found. Compared to measurement data from a real district heating network, the simulation results led to a larger error than in the controlled test set-up, but the general trend is still approximated closely and the model yields results similar to a pipe model from the Modelica Standard Library. However, the presented model simulates 1.7 (for low number of volumes) to 68 (for highly discretized pipes) times faster than a conventional model for a realistic test case. A working implementation of the presented model is made openly available within the IBPSA Modelica Library. The model is robust in the sense that grid size and time step do not need to be adapted to the flow rate, as is the case in finite volume models.

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