

ABSTRACT

“Expert Energy Management and Control of Microgrids using various Meta-Heuristic Techniques under environmental uncertainties”

Higher load demands over the years have forced network operators to include improvements within traditional power systems. Again the need for clean power production initiates inclusion of renewable power sources within the system. In this research work, investigation of low cost, low emission system is performed and energy management strategy in microgrid involves utilization of renewable resources like solar photovoltaic arrays as well as wind power. This research may offer a substantial technological solution and energy management strategy involving cost and emission minimization processes. This can be highly beneficial for developing countries like India that will facilitate to provide electricity at subsidized rates to the common people, at the same time maintaining threshold limits for pollutant emissions hence curtail air pollution, thus satisfying environmental considerations at large.

Microgrid is a small scale power generation network consisting of distributed generation units (DG). Microgrids are connected to the main grid via power electronic devices, i.e. voltage source inverter system (VSI) and many other devices. Various factors such as global warming, greenhouse gas effects, rapid depletion of fossil fuels encourage research in this domain. Recent research has put forward utmost focus in improvement of distributed generation units, energy management in microgrids, along with improvement in areas of power electronics, etc. Energy management in microgrids is done to optimize microgrid performance. Integration of renewable energy resources viz. wind power and solar photovoltaic (PV) modules into a microgrid addresses both factors of environmental concerns as well as sustainable energy production. Renewable energy resources such as wind and solar power are easily affected by variation in weather condition, so taking account of this uncertainty is essential while formulating power flow problem. It is noteworthy that expert energy management in microgrid system is done for optimal operation of wind and solar power generation which covered the uncertainties associated with these generation resources via demand response programs as well as facilitated in minimizing costs as well as emissions.

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