

Optimal Power Flow and Peak Demand Management by Integrating Real-Time Price Based Demand Response Using Artificial Intelligence



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Abstract The goal of optimal power flow is to minimize power generating expenses as well as emission dispatch and power losses. However, it is the role of the power system to ensure the continuity and security of economic power. Electricity system engineers are faced with the task of efficiently managing available electricity to meet peak-hour demand. The ultimate goal of this research is to reduce peak hour energy consumption, power losses, energy generating costs, and emission dispatch. All of these smart grid system objectives are best catered to and handled by optimum generator scheduling with the implementation of an upgraded demand response approach. To formulate this problem, consider the standard IEEE 57-bus system to be a test boat. The Cuckoo search method and the Grasshopper optimization algorithm are used in this research to solve a stochastic nonlinear optimization problem. Implementing the planned demand response approach benefited both utilities and customers. A comparison analysis of existing demand response systems and the suggested model proves their efficacy.

Keywords Demand response • Dynamic pricing • Optimal power flow • Peak load management

Abbreviations

a, b, c, d, e	Fuel cost coefficients
CPP	Critical peak price
DA-RTP	Day-ahead real-time price
DEED	Dynamic economic emission dispatch

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