

Intelligent Minimal Allocation of Capacitors in Distribution Networks Using Genetic Algorithm

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Abstract : A distribution system is an interface between the bulk power system and the consumers. Among these systems, radial distributions system is popular because of low cost and simple design. In distribution systems, the voltages at buses reduces when moved away from the substation, also the losses are high. The reason for a decrease in voltage and high losses is the insufficient amount of reactive power, which can be provided by the shunt capacitors. But the placement of the capacitor with an appropriate size is always a challenge. Thus, the optimal capacitor placement problem is to determine the location and size of capacitors to be placed in distribution networks in an efficient way to reduce the power losses and improve the voltage profile of the system. For this purpose, in this paper, two stage methodologies are used. In the first stage, the load flow of pre-compensated distribution system is carried out using 'dimension reducing distribution load flow algorithm (DRDLFA)'. On the basis of this load flow the potential locations of compensation are computed. In the second stage, Genetic Algorithm (GA) technique is used to determine the optimal location and size of the capacitors such that the cost of the energy loss and capacitor cost to be a minimum. The above method is tested on IEEE 9 and 34 bus system and compared with other methods in the literature.

Keywords : dimension reducing distribution load flow algorithm, DRDLFA, genetic algorithm, electrical distribution network, optimal capacitors placement, voltage profile improvement, loss reduction

Conference Title : ICMEE 2015 : International Conference on Mechanical and Electrical Engineering

Conference Location : Los Angeles, United States

Conference Dates : September 28-29, 2015