ABSTRACT

Distributed generations are really inevitable for modern deregulated power systems to meet enormous load demand. The proper allocation of distributed generation (DG) units in the distribution systems is very crucial for improving technical performance as well as gaining economical benefits. A method based on heuristic technique and loss sensitivity is proposed for the placement of DG units in the distribution networks. The optimum size of DG units are obtained by using both genetic algorithm and particle swarm optimization methods to keep real power loss, node voltage and branch currents within specified limits. The DG units have the potential to transform distribution networks into microgrids for supplying total loads and losses of isolated areas. The proper positioning and penetration of DG power plays an important role to meet load demands and improve technical performance of microgrids. An analytical based approach is proposed for finding the locations and sizes of DG units in the microgrids to minimize real power loss while voltage and current constraints are satisfied. A method based on heuristic technique is also presented to reconfigure the distribution and microgrid networks for reducing real power loss of the system.

Loss allocation is basically the way of sharing power losses among all users through exact instruction to avoid unfairness. An exact method is used for the allocation of real power loss to each user of distribution networks based on true impact of each user on network losses. Nowadays, voltage stability issue is of major concern in distribution networks due to ever growing load demand and presence of DG units. A new voltage stability index based on active power loss is proposed to identify the node which is most sensitive to voltage collapse and to indicate the severity of the loading situation of the system.