Abstract

Distribution system operating environments are changing rapidly due to the integration of the intermittent renewable in to the power grid at the distribution side of the power system. Therefore, with increasing number of wind based distributed generators (DFIGs) being installed within distribution systems, the traditional methods for distribution system modeling, DFIG placement & sizing, network reconfiguration needs to be reviewed and better practical ones developed to cater for the intermittent renewable power. The combined participation factors, realized by the Newton Raphson method, capture network parameters, load distributions and DFIG capacities (sizes) and locations have been formulated considering real and reactive power. A distributed slack bus model taking into consideration network sensitivity is proposed in the research as compared to the distributed slack bus models based on the DFIG capacity, DFIG domains and the single slack bus model. DFIG placement and sizing using a particle swarm optimization method (PSO) and a hybrid of GA and PSO (HGAPSO) and by load flow method are compared. With simulated results, the optimal location of the DFIG is the primary distribution system, with the HGAPSO giving improved results as compared to the ordinary PSO and the load flow. The active distribution network reconfiguration problem with an objective function of reducing real and reactive power losses in the presence of DFIG and uncertain loads proves the practicability of such a method in reducing power losses and in improvement of the voltage profile .Here an hybrid method of bacterial foraging and differential evolution (HBFDE)is applied. The proposed methods, as applied to the IEEE 33 Bus Radial distribution system ,are found to be effective in the power loss reduction in the power system wind based distributed generation.