Optimal Wind Based DG Placement Considering Monthly Changes Modeling in Wind Speed

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Abstract : Proper placement of Distributed Generation (DG) units such as wind turbine generators in distribution system are still very challenging issue for obtaining their maximum potential benefits because inappropriate placement may increase the system losses. This paper proposes Particle Swarm Optimization (PSO) technique for optimal placement of wind based DG (WDG) in the primary distribution system to reduce energy losses and voltage profile improvement with four different wind levels modeling in year duration. Also, wind turbine is modeled as a DFIG that will be operated at unity power factor and only one wind turbine tower will be considered to install at each bus of network. Finally, proposed method will be implemented on widely used 69 bus power distribution system in MATLAB software environment under four scenario (without, one, two and three WDG units) and for capability test of implemented program it is supposed that all buses of standard system can be candidate for WDG installing (large search space), though this program can consider predetermined number of candidate location in WDG placement to model financial limitation of project. Obtained results illustrate that wind speed increasing in some months will increase output power generated but this can increase / decrease power loss in some wind level, also results show that it is required about 3MW WDG capacity to install in different buses but when this is distributed in overall network (more number of WDG) it can cause better solution from point of view of power loss and voltage profile.

Keywords : wind turbine, DG placement, wind levels effect, PSO algorithm
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