

Master: Abstract

The operation and structure of distribution system is changing with the integration of distributed generation, based on alternative energy sources, including renewable energy sources (wind, solar). Among the new issues, there is the question of stability of distribution systems in the presence of Wind Turbine distributed generation.

Egypt is endowed with an excellent wind energy potential, especially in the Red Sea coast area where a capacity of 20 GW could be achieved, as the annual average wind speed is around 10 m/s.

The growth of wind energy penetration level in distribution system arise the concern about its impact on the operation of the power system, especially voltage stability and power loss. Among major concerns this research, studied the impact of connecting wind Turbine (WT) in radial distribution system with different penetration levels and different power factor (lead and lag) on power system voltage stability, power loss reduction and optimal size and location to install WT in distribution system to minimize active power loss. Load flow calculation carried out using forward-backward sweep method. The analysis proceeds on a 9 and 33 bus radial distribution systems. Results show that voltage stability enhancement and power loss reduction should be considered as WT installation objective.

Also in this study, the optimal placement and size for installing WT or CB in distribution systems to minimize system active loss was studied. The optimization technique was applied on 9 and 33 bus systems. Results shows that installing WT is better than CB in losses minimization without violate optimization constraints.

-Papers :-

- 1- Radial Distribution System; SI index; Voltage Stability, Optimal Size and Location of Wind Turbine.

ABSTRACT -

The growth of wind energy penetration level in distribution system arise the concern about its impact on the operation of the power system, especially voltage stability and power loss. Among major concerns this paper, studied the impact of connecting wind turbine (WT) in radial distribution system with different penetration levels and different power factor (lead and lag) on power system voltage stability and power loss reduction. Load flow calculation carried out using forward-backward sweep method. The analysis proceeds on a 9 and 33 bus radial distribution systems. Results show that voltage stability enhancement and power loss reduction should be considered as WT installation objective.

2-Comparative Analysis of Voltage Stability in Radial Distribution Networks with Different Distributed Generation

Abstract –

Integration of distributed generation (DG) units and shunt capacitors Banks (CB) in the radial distribution networks is one of the effective options that can be used to improve the system voltage stability and reduce system losses. Optimal sizing and siting of DG units and CB need to be ensured for strengthening the supply Stability of radial distribution systems (RDS). In this regard, a comparison needed to show the impact of connecting DG, CB, or load shedding (island operation) in RDS to maximize voltage stability and minimize the system losses. In this paper, a numerical method for the identification both optimal size and location to connect DG or CB to RDS. The strategic placement of DG units and CB is proposed for voltage stability enhancement and power loss reduction in a radial distribution feeder.

3- Investigation of Connecting Wind Turbine to Radial Distribution System on Voltage Stability Using SI Index and λ -V Curves

ABSTRACT

The growth of wind energy penetration level in distribution system arise the concern about its impact on the operation of the power system, especially voltage stability and power loss. Among major concerns this paper, studied the impact of connecting wind Turbine (WT) in radial distribution system with different penetration levels and different power factor (lead and lag) on power system voltage stability and power loss reduction. Load flow calculation carried out using forward-backward sweep method. The analysis proceeds on a 9 and 33 bus radial distribution systems. Results show that voltage stability enhancement and power loss reduction should be considered as WT installation objective.

Keywords: *Power Loss, Radial Distribution System, SI index; Voltage Stability, Optimal Size and Location of Wind Turbine*