Voltage stability indices studies on optimal location of wind farm in distribution network

ABSTRACT

The increasing demand for electrical power contributes major challenges especially in power utilities as one of the main issues is voltage instability. The voltage instability occur in both transmission and distribution network may weaken the whole operation of power system that will significantly limit the growth of load. As a result, voltage collapse blackout occurs in the power system whereas at this point the voltage become uncontrollable. The penetration of Wind Power Plant (WPP) in distribution system may be a good alternative to accommodate this challenge. However, the location of WPP play the important role to fully utilize the power generated by WPP that will not only improve the voltage stability margin but also reduce the power losses and enhance voltage profile. This paper presents the analysis for the selection of the optimal location of WPP integration from voltage stability, voltage profile and total system losses overview. The study was conducted using IEEE 30 Bus test system as the benchmark system and DigSILENT PowerFactory 16 as simulation tools.

Keyword: Optimal location; Voltage stability indices; Power flow study; Wind power plant