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Abstract:

Instability in a power system may be manifested in many different ways depending on the system configuration and operating mode. Voltage instability in power distribution systems could lead to voltage collapse and thus power blackouts. It is required to know the strength of the buses to improve the stability of the system. This paper analyzes and discusses the performance of static voltage stability of a 16 bus test system by varying the loadability with different sensitivities of distributed generation (DG). The synchronous generator, asynchronous generator and fuel cell are included in DG system. The performance analysis has been done by the simulation works using the DIgSILENT Power Factory 14.0. The analysis indicates a negative value of sensitivity with the increasing active power when using the asynchronous generator in various positions. The strength of different buses have been determined throughout the simulation according to the value of sensitivity and found that bus 7 is the weakest bus and bus 8 is the strongest bus. The increase in active power causes a decrease in loadability using asynchronous generator which shows no convergence in load flow after a certain value which means that the voltage is collapsed. So the placement of asynchronous generator in this test system is found inappropriate due to have lacking of reactive power.

Keywords: Voltage Stability, Distributed Generation, Voltage Sensitivity Factor and Loadability.