VOLTAGE STABILITY ANALYSIS OF A GRID CONNECTED WIND FARM

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by

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Declaration

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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Abstract

Voltage instability is one of the problems that can cause a wind farm to shut down without any warning. The resulting sudden drop or generation can lead to large power system faults. The voltage instability issue mainly plagues one type of wind farm. The squirrel cage induction generator fed wind farms. This is due to the lack of reactive power support in this type of generators.

To assess the stability of such wind farms a dynamic model of wind farm has been developed by accumulating the following models.

1. Squirrel cage induction machine
2. Wind turbine
3. Transmission line
4. Transformer
5. Capacitor bank

Model parameters were calculated and simulations were performed for a wind farm consisting of eight wind turbine generators each with a capacity of 1805kVA.

Stability was assed for normal 33kV national grid level network voltage variations of ± 10% of rated Voltage. The wind farm is shown to be stable for this variation and operated within normal parameters.

The wind farm was also checked for LVRT capability and found to be within CEB specifications.

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