Voltage Stability Investigation of the Egyptian Grid with High Penetration Level of Wind Energy During Steady State and Transien

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Abstract

The large penetration level of wind farms might have deleterious effects on the voltage stability of the electric network. This is because wind farms absorb reactive power from the transmission network and an observable drop in bus voltages occur. To mitigate this effect, system must be studied under steady-state and transient conditions.
The main objective of this study is to analyze the voltage stability of the Egyptian Electrical Network with large scale wind power under normal condition, under single contingency (N-1) and under transient condition. The single contingency is defined as the loss of any transmission line, transformer, or generator. In addition, the paper determines the size of reactive power compensation devices (capacitors or STATCOM) that should be installed at weak buses to prevent the voltage collapse during normal and transient states.

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