# An investigation of the impact of power transformer parameters on voltage collapse in a high voltage A.C Network

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**Abstract:**
Voltage collapse is the process by which the sequence of events accompanying voltage instability leads to a low unacceptable voltage profile in a significant part of the power system. Voltage stability is of major importance for successful operation of power systems. Assessment of voltage stability is needed to utilize power transmission capacity efficiently and to operate the system uninterruptedly. Studies show the effect of transformer tap changers on voltage collapse. However, a survey of the literature shows little research on the impact of power transformer parameters on voltage collapse in high voltage ac networks. This was the motivation behind the current study, whose objective was to investigate the impact of power transformer parameters (namely, leakage reactance, series resistance, magnetizing conductance, etc) on voltage collapse in such power networks. The study was conducted through load flow analysis. The analysis was performed on a 5-bus, 132 kV ac network. The load is connected via a power transformer to one bus, considered to be the candidate bus. It is the parameters of this transformer that the study was based on. From the load flows analysis, real power-voltage (P-V) curves are generated at the candidate bus and the neighboring buses. These P-V curves predict the voltage stability margin based on real power demand. Results show that with increase in parameter values, the voltage stability margin reduces; hence the power system becomes more vulnerable to voltage collapse. However, increase in transformer shunt susceptance increases voltage stability margin, reducing likelihood of voltage collapse. It is recommended that power system voltage stability be improved by replacing the traditional rectangular conductor-winding transformer with the Cross-linked polyethylene (XLPE) cable-winding transformer because the capacitive nature of these cable winding gives higher shunt susceptance.