

Mitigation of Saturation in Dynamic Voltage Restorer Connection Transformers

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Abstract

During the transient period at the start of a voltage sag, a DVR injection transformer can experience a flux-linkage that is up to twice its nominal steady-state value. In order to prevent the transformers from saturating it is normal to choose a rating flux that is double that of the steady-state limit. An alternative method is to limit the flux-linkage during the transient switch-on period, thus preventing saturation. It is shown through both simulation and experimental results that an adaptive form factor can be applied to the DVR injected voltage, which minimizes the disturbance seen by a sensitive load, while at the same time preventing saturation.

The proposed method removes the need for rating the series injection transformers for the DVR transient switch-on period, and therefore removes the redundancy normally associated with their steady state operation. In economic terms, this may reduce the total cost of a DVR system, thus making it a more attractive solution for voltage sag mitigation.