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Effect of Load Capacitance on Sympathetic Inrush Current

Abstract

In electrical systems, transformers are used to step up or step down the voltage to meet the needs of different loads. When a transformer is energised for the first times, it draws a high current or also known as inrush current. The inrush current can cause a several issues such as voltage dips, mal-operation and other in the electrical network. Besides, when the sympathetic phenomena are occurred, the magnitude and duration of the current changed dramatically. One of the factors that can affect the magnitude and duration of inrush current is the presence of load capacitance. This study uses a simulation model to investigate the impact of load capacitance on sympathetic inrush current that drawn by two-parallel connected transformers under different circuit breaker operating times. The goals of this project to investigate the effect of load capacitance on sympathetic inrush current as well as by varying the value of load capacitance to observe how severe it is. In this paper, the effect of load capacitances is analysed by modelling 100 kVA, 11 kV/415 V of wye-delta of single line (circles) transformer and all the schematics model and simulation results are performed by PSCAD software. As a result, it is expected to observe the magnitude and duration of sympathetic inrush current to make a comparison within ten different values. According to simulation results, the higher value of load capacitance can produce the lower magnitude of sympathetic inrush current as well as shorten the duration of the current appear which is the time taken to reach steady state. The findings of this study can aid in the design of the transformers to minimize the impact of sympathetic inrush current. In conclusion, this project contributes to new research contribution and expected to be completed within the given time frame.

Keywords

Load Capacitance; Magnitude; PSCAD; Sympathetic Inrush Current; Transformer