

Transient response study on transformer windings under impulse voltage stresses.

ABSTRACT

The study reported in this paper was aimed to investigate transient response of power transformer when lightning current pass through its winding. Analysis of distribution voltage at the winding taps was done, both by experimental and numerical simulation, by applying IEC-71 standard current surge (8/20 μ s impulse current and 1.2/50 μ s impulse voltage). Transformer's constants as: R, L, C were derived from the transformer construction, which consists of 9 winding layers at HV-side. The wave-shapes of the voltage across the winding sections were recorded. The response of the windings was then compared with results of a simulation using EMTDC/PSCAD. The simulation based on an RLC network model resulted in wave-shapes that are in good agreement to those of the experiment. Both results of the simulation and experiment show that the distribution of the impulse voltage across the windings is non linear, especially during the period of fraction of microseconds. Furthermore, results of the investigation show that a simple capacitance network model is sufficient for study of the impulse voltage distribution across transformer windings.

Keyword: EMTDC/PSCAD; Transformer model; Transient overvoltage.