

УДК 621.314.212: 621.314.222.6

A.A. Malinovskyi, O.L. Nykonets, N.H. Maltseva, M.Y. Oliynyk

Lviv Polytechnic National University,
Department of Power Distribution Systems
of Industrial Enterprises, Cities and Agriculture,
Department of Electric Power Stations

ELECTROMAGNETIC PROCESSES IN POWER TRANSFORMER WINDINGS DURING TYPICAL PULSE TESTING

© *Malinovskyi A.A., Nykonets O.L., Maltseva N.H., Oliynyk M.Y.*

Failure of power transformers is mainly caused by the action of switching and lightning overvoltages. Frequently under these conditions the interturn insulation is damaged. According to the authors suggestions the appearing of the resonant overvoltages can be the main reason of interturn insulation damage.

The goal of the research is to reveal the dangerous coordinates of the electromagnetic transient modes in the transformer windings during typical pulse tests.

To reveal the range of the resonant frequencies and dangerous areas of the transformer windings the researches of the power transformer overvoltages were carried out. Researches were conducted using the computer simulation methods based on improved model of the transformer under research. The simulation of the transformer operation when typical test impulses were applied was conducted. The features of the processes during the appearing of fluctuations of the voltage of the resonant character in the high voltage winding was shown. The frequency of these processes depends on the type of the test impulse.

The values of the resonant frequencies obtained during the mathematical experiment are in correlation with the results obtained when the physical experiment was carried out using the same transformer.

Conclusions. 1 When the pulse overvoltage is applied to the transformer winding the voltage resonance with one of possible resonant frequencies can appear. Amplitudes of free oscillations during such mode are commensurable with the applied pulse amplitudes. Duration of oscillations is higher in no less than ten times comparing with the pulse duration. These overvoltages can cause the interturn short circuits.

2. The main means to increase the power transformer reliability is to use high-voltage surge arrestors in all networks up to 110 kV.

3. It is necessary to conduct the researches of the most widely used transformers constructions in order to reveal the ranges of the resonant frequencies and dangerous areas of the transformer windings where the insulation should be strengthened.