

The Study of Partial Discharge Propagation Signal Limitation for Localisation Method inside a High Voltage Transformer Winding

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In high voltage plant, ageing processes can occur in the insulation system which are totally unavoidable, ultimately may limit the operational life of the plant. Partial discharge (PD) activities inside a transformer may in part be due to ageing processes and these unwanted activities can lead to further ageing and degradation of the dielectric until, if left unchecked, there could be a catastrophic failure. Therefore, PD condition monitoring for high voltage autotransformers and particularly localisation of PD along transformer windings has become an important research area worldwide in order to provide asset health information that ultimately enables maintenance and replacement processes to be carried out effectively. Various methods of PD detection and location have been proposed and discussed in the literature that involves the study of PD propagation inside the windings and also investigate methods for localisation of PD activities. Nevertheless, due to the complexity of a transformer winding construction, the behaviour of high frequency transient PD pulses is not easy to determine and many assumptions made in development of PD pulse propagation theory do not hold in practice.

This paper reports on further analyses of PD output signals which generated using artificial PD sources and measured electrically for PD localisation inside a transformer winding. The aim of the analysis is to look in detail into measured PD pulse signals especially at their magnitude and behaviour that was assumed to influence the signal energies. Comparison of PD signals with different magnitudes associated with a single PD source has been undertaken. Obtained results have been used to validate a localisation technique using Wavelet analysis and Principal Component Analysis (PCA). Full results will be presented in the paper.