

Understanding and Localization of Partial Discharge by Numerical Analysis of Acoustic Emission

Abstract

The condition of electrical insulation in transformers is one of the most important factors that govern transformer life. Different factors influence the aging of the transformer insulation and one of the most important factors is the occurrence

of partial discharge (PD). Frequent occurrence of PD can cause damage to the insulation which may eventually lead to its failure. Among the PD detection techniques, there is increased interest in the PD acoustic detection method because it overcomes several disadvantages inherent in electrical methods. The main objective of this work is to introduce mathematical model of partial discharge and study the effect of its travelling path on its arrival time to detect its location.

Materials and Methods: A complete setup was examined to get the

experimental results by creating PD in transformer oil and collecting the produced acoustic waves via different sensors through different paths. **Results:** The proposed model presents the propagation of acoustic wave with direct and indirect path which helps in calculating arrival time. This will identify the location precisely by detecting the peak value from the modelled signals. **Conclusion:** The output acoustic wave received by the PD AE sensor can be analyzed by the mathematical model. The attenuation of each component can be

understood to calculate the real arrival time of peak value. The location will be determined by comparing with the experimental one.