

عنوان مقاله:

Mechanical Fault Types Detection in Transformer Windings Using Interpretation of Frequency Responses via Multilayer Perceptron

محل انتشار:

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خلاصه مقاله:

The Frequency Response Analysis (FRA) technique has advantages in identifying faults related to power transformers, but it suffers from the interpretation of frequency responses. This paper presents an approach based on statistical indices and Artificial Neural Network (ANN) methods to interpret frequency responses. The proposed procedure divides frequency responses into four frequency regions based on frequency resonances and anti-resonances. Then, Lin's Concordance Coefficient (LCC) index is used as one of the most appropriate numerical indices to extract features of the four frequency regions. Finally, the Multilayer Perceptron (MLP) neural network is trained by the extracted features to identify and differentiate the types of winding faults. Besides, other intelligent algorithms such as Support Vector Machine (SVM), Extreme Learning Machine (ELM), Probabilistic Neural Network (PNN), and Radial Basis Function (RBF) neural network have been employed to compare the classification results. The proposed techniques have been practically implemented. The Axial Displacement (AD) and Disk Space Variation (DSV) faults are applied as two common mechanical faults in different locations and intensities on the ۲۰kV windings of a ۱.۶MVA distribution power transformer and their corresponding frequency responses are calculated. Frequency responses calculated from the AD and DSV faults constitute the MLP input data set. The network is trained with part of the input data, and the rest of the data is allocated to validate and test the network. The results show that the suggested method has more proper performance than others using the phase component of the frequency responses in interpreting frequency responses and separation and identifying various mechanical fault types of transformer windings.

کلمات کلیدی:

Power transformer, mechanical fault, frequency response analysis (FRA), artificial neural network (ANN), multilayer (perceptron (MLP

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