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Study on Diagnosis of Power Transformer Winding Deformation through Vibration Signal

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As one of the most important equipment in power system, the safe and stable operation of power transformer is of great importance and the condition maintenance and fault diagnosis can avoid breakdown of power transformer as well as save investment. Since 1980s, lots of method, such as Frequency Response Analysis, Low Voltage Impulse has been put into winding deformation detection. Among these method, Vibration Analysis from oil tank has gain much attention through its advantage that it is closely related with the mechanical condition of winding and core and it can be used in on-line monitoring. This paper based on the principle of transformer vibration and Fourier Transform, choose odd and even harmonic ratio, the ratio of 100Hz, the ratio of maximum amplitude and complexity of spectrum as vibration eigenvalue to indicate the vibration change under different fault of transformer. What's more, the alert threshold for diagnosis was got through 78 power transformer vibration signals. Through the above two steps, the diagnosis method of power transformer is concluded and put into filed test. Among the test results, vibration eigenvalue from one 220kV power transformer which has suffered several short-circuit impact shows that the winding of phase C has the bulge and buckling deformation. The conclusion and diagnosis results are proved to be correct after the transformer was sent back to the manufacturer and the core and winding was hang out of the oil tank. The diagnosis method for power transformer in this paper based on tank vibration can make contributions to condition monitoring.

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