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Influence Factor on Sweep Frequency Impedance to Detect Winding Deformation within Power Transformer

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As a device of power transmission and distribution, a power transformer is considered to be the heart of a power system, and its safe running is important. The rate of transformer failures caused by the winding deformation remains high, therefore the study on detecting the transformer winding deformation is of great significance to avoid unexpected accidents and improve the reliability of the operation in power systems. To detect the winding deformation within a power transformer effectively, people develop lots of non-destructive methods, such as frequency response analysis (FRA), short circuit impedance (SCI), sweep frequency impedance (SFI), low voltage impulse (LVI), and so on. As a novel detection technique, the SFI method is widely used on onsite test due to its well anti-jamming ability and definite standard code, but its characteristics still need to be studied further. In this paper, a fast, economical, and nondestructive testing system was established to study influence factors, which included the length of the grounding line, the cross-sectional area of the outside short circuit line, and the shape of the inside short circuit line, on SFI method during detecting winding deformation within a power transformer. The experimental results show that: 1) the change of the grounding line length leads to the change of the SFI curve at high frequencies, which results in the misjudgment of the transformer winding deformation. 2) the cross-sectional area of the outside short circuit line impacts on the SFI value at 50 Hz. 3) the shape change of the short circuit line between two disks does not affect the tendency of the SFI curve during simulating a short circuit fault within a power transformer.

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