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Mon-Af-Po1.23-08 [117]: Residual Flux Measurement and Reduction in the Single-phase Power Transformer

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When a large power transformer is switched on, the residual flux in the iron core may cause inrush current, which may cause the transformer to no longer be put into operation, thus affecting the continuity of power supply in the power grid. However, the traditional methods can only estimate the residual flux. It is impossible to effectively weaken the residual flux. Therefore, the study of residual flux in the closed magnetic core of a power transformer has considerable significance.

This paper describes a novel method for analyzing and detecting the residual flux, based on externally applying multiple positive and reverse excitation. This method can accurately measure the residual flux of iron core without damaging the transformer itself and can be extended to the residual flux analysis of three-phase transformer.

A model of single phase transformer core is built to simulate transients in COMSOL software. Under the same residual flux, different current responses will be generated when the external positive and reverse excitation is applied. Under different residual flux, different current responses will also be generated when the same external excitation is applied, the experimental results show that the proposed method can effectively determine the direction and accurately measure magnitude of the residual flux. Moreover, according to the measured magnitude and direction of the residual flux, the demagnetization data of the transformer is set to effectively weaken the residual flux.

Measurements of residual flux for a simple laboratory setup verified that the simulation gave reasonable values.

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