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Tue-Af-Po2.23-04 [91]: Research on the Squeeze Current Effect of the Foil-type Excitation Windings under the Condition of High Frequency

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Combined with the design of magnetic properties measurement structure and high frequency transformer, the traditional copper stranded wire windings increase the design demand of the core window area to limit the improvement of measuring device. The kind of winding has many turns leading to an increase in inductance. In this paper, an improved windings design method is proposed to optimize the magnetic properties measuring device and high frequency transformer that decreases the inductance and volume of windings. The excitation windings will be in foil-type structure under the condition of large current. But the current density distribution of foil windings is more complex in high frequency. The squeeze current effect of the foil windings comes from the magnetic induction strength B perpendicular to the copper foil, and the varying magnetic flux produces the eddy effect inside the copper foil windings. The induced current will affect the distribution of the conduction current in the windings. As the frequency increases, this phenomenon will become more pronounced. Some methods are to add magnetic shielding plate at both ends of the windings. But these methods have yet to consider various factors under the comprehensive high frequency impact. In this paper, the method that diminishing the squeeze current effect by optimizing the foil windings parameters and adding the shielding plate is described in detail. The influence factors of current density distribution in foil windings are analyzed from the width, thickness, segment number of windings and frequency. Meanwhile, the squeeze current effect of foil windings can be reduced by applying the magnetic shielding plate on both sides of the windings, and the influence of the magnetic shielding plate parameters on the squeeze current effect is analyzed in detail. A good current sharing effect can be obtained.

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