Temperature and Frequency Dependence of Hysteresis Characteristics

Miklós Kuczmann
Department of Automation, Széchenyi István University, Győr, Hungary
kuczmann@sze.hu

Abstract

The comprehesive analysis of hysteresis characteristics dependence on temperature and frequency has been performed by a computer controlled measurement system. Sinusoidal magnetic flux density with pre-defined amplitude and frequency has been generated and the concentric hysteresis loops are measured. The toroidal shaped specimen is situated inside a furnace which temperature can be set.

The full paper shows the Preisach model and the Jiles-Atherton model to approximate the measured data.

The static Preisach model is built up by the Everett function. The frequency dependence is modelled by an extra magnetic field intensity term identified by the measured data. The effect of temperature on the Everett function is analyzed and approximated.

The Jiles-Atherton model is based on ordinary differential equations which parameters are set by the measured curves.

References

1. A. Iványi. Hysteresis Models in Electromagnetic Computation. Academic Press, Budapest, 2017.
2. S. Steentjes and S. Zirka and Y. I. Moroz and K. Hameyer. Dynamic Magnetization Model of Nonoriented Steel Sheets. IEEE Trans. on Magn. 50(4) (2014) 1-4.