

Investigation of Anisotropy and Frequency Influence on Coercivity and Remanence of Electrical Steel Sheets

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In the electrical industry the most widely used soft magnetic material is electrical steel. Magnetic anisotropy resulting from Goss texture has probably the largest influence on magnetic properties the electrical steel sheet. Modeling of hysteresis needs to mapping all main features of hysteresis, such as initial magnetization, saturation, coercivity, remanence and frequency-dependent losses. The aim of the paper is to present the influence of anisotropy and frequency on remanence and coercivity of grain-oriented electrical steel sheets. The experiment was carried out on grain-oriented (GO) and non-oriented (NO) electrical steel sheets. The measurements of specific total power loss were carried out in an Epstein frame. The flux density range was varied from 0.1 T to 1.3 T - 1.8 T in dependence on magnetization direction. There were chosen 10 to 12 measurement frequencies from the range of 2 Hz to 80 Hz or 100 Hz. Number of frequencies allowed to analyze frequency behavior of chosen magnetic properties of electrical steel. The frequency behavior of remanence and coercivity being parameters of dynamic hysteresis loops were analyzed and described. The remanence and coercivity are strongly dependent on magnetization direction. Proposed models are universal for any magnetisation angle 0° to 90° and frequency below 100 Hz.