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ABSTRACTS

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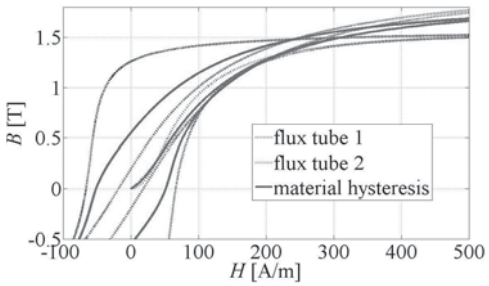

Fig. 1: Hysteresis properties in different flux tubes with the corresponding irregular hysteresis of the material

DV-15. Modeling the Influence of Varying Magnetic Properties in Soft Magnetic Materials on the Hysteresis Shape Using the Flux Tube Approach. *M. Petrun*[1], S. Steentjes[2], K. Hameyer[2] and D. Dolinar[1]
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Due to the mechanical treatment local detrimental changes occur in the microstructure of the soft magnetic material [1]. These induced stresses strongly deteriorate the soft magnetic materials' properties, i.e., the shape of material's hysteresis loop [2]. Several theories and models where developed for magneto-mechanical modeling of soft magnetic materials [3]-[5]. However most of them do not account for varying magnetic properties inside magnetic material due to local deteriorations, but rather deal with the whole material with homogeneously altered magnetic properties. In addition, many established hysteresis models fail to reproduce such irregular hysteresis loops correctly. The main objective of this paper is to present a new approach to successfully model hysteresis loops of NO SMSSs that were exposed to mechanical treatment, which introduces different stresses that (locally) alter the magnetic properties of the SMSS. Hence such NO SMSSs often have irregular hysteresis loops. To successfully overcome this problem, such loops can be modeled using the flux tube approach, where the soft magnetic material is modeled by an adequate magnetic equivalent circuit. The SMSS is in general divided into individual flux tubes that have different magnetic properties and describe the varying magnetic properties inside the SMSS. The magnetic properties can be taken into account using various hysteresis models. Figure 1 shows exemplarily calculated hysteresis loop when using different magnetic properties in individual flux tubes. In this way an irregular hysteresis loop is obtained only from regular hysteresis loops that describe the magnetic properties inside individual flux tubes. In the full paper the presented methodology is discussed and analyzed in detail, where the advantages and limitations are pointed out. Such methodology is very promising when modeling SMSSs with irregular hysteresis loops.

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