

## MAGNETIC PROPERTIES OF IRON-PHENOLFORMALDEHYDE RESIN SOFT MAGNETIC COMPOSITES IN DC AND AC MAGNETIC FIELDS

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### **Abstract**

The validity of Steinmetz law describing the ac or dc energy losses as a function of maximum induction has been investigated for iron based soft magnetic composites (SMCs) for induction up to 1.4 T in frequency range from dc to 1.2 kHz with the effort to find a physical meaning of the coefficients in Steinmetz law. In dc magnetic fields the coefficients of the Steinmetz law were expressed mathematically using the Rayleigh law. The range of validity of Steinmetz law in dc magnetic fields was found for maximum induction from 0.3 T to 1.2 T. The hysteresis loops at lower maximum induction having typical “straight” shape of SMCs were approximated by linear functions in order to express the dc losses in a form of Steinmetz law. The Bertotti’s statistical model was used for modification of Steinmetz law in dc magnetic fields, of SMCs magnetized in dc magnetic field, to the model for total energy losses, which appear when an ac magnetic field is applied. In this case for the total energy losses was the dynamic energy loss, consisting of interparticle eddy current losses, intraparticle eddy current losses and excess losses, added to hysteresis loss.

## **DEVELOPMENT OF A HIGH-EFFICIENCY FAST-NEUTRON DETECTOR**

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