

Energy Losses in Fe Based SMCs Influenced by Ferrite Content

Martin Tkáč^{1, a)}, František Onderko^{1, b)}, Zuzana Birčáková^{2, c)}, Samuel Dobák^{1, d)},
Peter Kollár^{1, e)} Mária Fáberová^{2, f)}, Ján Füzér^{1, g)}, Radovan Bureš^{2, h)}
and Juraj Szabó^{2, i)}

¹ *Institute of Physics, Faculty of Science, Pavol Jozef Šafárik University in Košice, Park Angelinum 9, 04001 Košice, Slovakia*

² *Institute of Experimental Physics, Slovak Academy of Sciences, Watsonova 47, 04001 Košice, Slovakia*

^{a)} *Corresponding author: martin.tkac@student.upjs.sk*

^{b)} *frantisek.underko@upjs.sk; ^{c)}zbircakova@saske.sk; ^{d)}samuel.dobak@upjs.sk; ^{e)}peter.kollar@upjs.sk; ^{f)}mfaberova@saske.sk; ^{g)}jan.fuzer@upjs.sk; ^{h)}rbures@saske.sk; ⁱ⁾jszabo@saske.sk*

Abstract. Soft magnetic composites (SMCs) have recently been the subject of intensive research. They provide a unique combination of electrical and magnetic properties that conventionally used materials cannot have. Due to the high resistance and relatively high permeability values, these materials have a high application potential. The aim of this work was to investigate the effect of increasing the ferrite content in ring samples made of iron powder, which underwent mechanical and thermal treatment before pressing, coated in an electrical insulating layer of SiO₂. We examined four samples containing 0, 10, 20 and 30 weight percentage of Ni-Zn / Cu-Zn ferrite powder. We analyzed energy losses in two ways: by dividing into high and low induction losses and by the equation $W_{tot} = Wh + We + Wa$, where W_{tot} are the total energy losses, Wh are the hysteresis losses, We are the eddy current losses and Wa is the anomalous losses. By analyzing energy losses, we found that increasing the ferrite content from 0 to 10 weight percent reduces energy losses and further increasing the ferrite content causes a deterioration of the magnetic properties.

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