

The shielding effectiveness of a magnetic fluid in radio frequency range

B. Dolník,¹ M. Rajňák,^{1,2} R. Cimbala,¹ I. Kolcunová,¹ J. Kurimský,¹
J. Džmura,¹ J. Petráš,¹ J. Zbojovský,¹ P. Kopčanský,² and M. Timko²

¹*Department of Electric Power Engineering,
FEI, Technical University of Košice,
Mäsiarska 74, 041 20 Košice, Slovakia*

²*Institute of Experimental Physics, Slovak Academy of Sciences,
Watsonova 47, 040 01, Košice, Slovakia*

This article builds on the previous work and describes the interaction of transformer oil-based magnetic fluid (MF) with the radio frequency (RF) magnetic near-field. Three prepared samples of the MF used as a barrier to magnetic near-field, consist of transformer oil and dispersed magnetite nanoparticles coated with oleic acid. We pay attention to the important area related to the electromagnetic field shielding by the MF. Such sample of the MF may be a good candidate for applications where it is necessary to simultaneously electrically isolate, remove the excess of heat and to shield electromagnetic interference (EMI). We present a method for the determination of shielding effectiveness (SE) of the MF under RF excitation conditions ranging from 500 MHz to 3 GHz. We report the effect of magnetic volume fraction in the MF and the effect of the sample thickness on the SE.