Transition from Single-Peak to Double-Peak Behavior of the GMI Effect in Cobalt-Base Microwires

Jozef Kravčák, [a)] and Michaela Gondeková [b)]

Department of Physics, Faculty of Electrical Engineering and Informatics, Technical University of Košice, Park Komenského 2, 042 00 Košice, Slovakia

[a)] *Corresponding author: jozef.kravcak@tuke.sk*
[b)] *michaela.gondekova@student.tuke.sk*

Abstract. The highly frequency-dependent GMI effect in the soft ferromagnetic microwire $Co_{77}Si_{15}B_8$ with a glass coating is used as a research tool. The magnetoimpedance measurement technique in the moderate frequency range is based on the skin effect and the variation of penetration depth. As the frequency increases, a transition from single-peak to double-peak behavior is observed. Hysteresis in the GMI ratio dependence reveals irreversible domain wall movement in the longitudinally magnetized core, occurring at low magnetic fields. An axial biased magnetic field is applied to influence the magnetic state of the CoSiB microwire during GMI measurements. The axial anisotropy of the central region (core) of the microwire contributes to asymmetric and hysteretic GMI responses, while the circumferential anisotropy of the shell of the microwire corresponds to non-hysteretic GMI behavior at higher frequencies. The applied axial biased magnetic field shifts the position of the GMI peaks and sets the working point into non-hysteretic GMI region, which is advantageous for potential sensor applications.