Abstract submission for:

“MagIC - Magnetism, Interactions and Complexity: a multifunctional aspects of spin wave dynamics”

(2-7 July 2017, Poznań - Biedrusko, Poland)

Contact details of the presenting author:

Surname: Mruczkiewicz
First name: Michal
Academic level: PhD
Institution: Institute of Electrical Engineering Slovak Academy of Sciences (IEE SAS)
Email: m.mru@hotmail.co.uk
Do you prefer oral or poster session? oral

About talk and poster session:

Experienced researchers and PhD students will have preference in oral sessions, while master's and undergraduate’s students will have preference for poster session. Availability of slots depends on the preference and demand of participants.

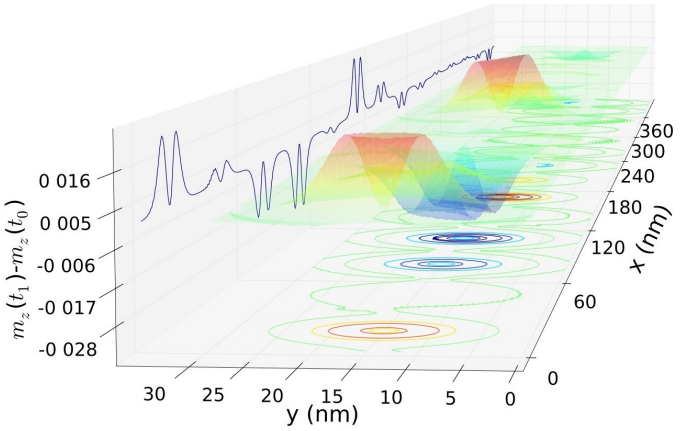
Please scroll down for a sample abstract on the following page.
Note: The length of the abstract should not exceed one page.

Spin Excitations in Ultrathin Films with Dzyaloshinskii-Moriya Interaction: Nonreciprocal Spin Wave and Skyrmion Dynamics

M. Mruczkiewicz
Institute of Electrical Engineering, Slovak Academy of Sciences, Dubravska cesta 9, 841 04 Bratislava, Slovakia
m.mru@amu.edu.pl

KEY WORDS: Dzyaloshinskii-Moriya interaction, Nonreciprocal Spin Wave, Skyrmion, Skyrmion dynamics, Spin excitation over skyrmion state

The spin excitations in ultrathin films and nanodots with Dzyaloshinskii-Moriya interaction (DMI) were under investigation. At first, influence of the DMI on propagation in single domain (SD) state was studied in magnonic crystals and stripes [1]. The effect of nonreciprocity induced by DMI was described. The stability of nonuniform magnetization states was evaluated in nanodisks, where influence of the presence of nanodisk boundaries and nonuniformities in multilayer structures was considered. Further, the spin excitations in nonuniform states in nanodots were analyzed, specifically, mapping of dynamical modes in vortex and skyrmion states of Bloch and Néel type was calculated [2] to understand the dynamics present in skyrmion state. The classification of low frequency gyrotropic modes and high frequency spin wave excitations was analogically showed. Further, influence of the nanodot shape (non-circular symmetry) on spin wave dynamics was studied and possibility of different mode excitations with uniform microwave magnetic field evaluated. The results point out at the possible spin wave excitations in Skyrmion Lattices (SkL), where non-circular potentials are spontaneously formed. Next, the spin dynamic in the array of nanodots was under investigation and possible coupling of skyrmion modes analyzed, see Figure [3].



A collective spin excitation in an array of nanodisks: breathing skyrmion mode.

[1] Mruczkiewicz, M., & Krawczyk, M. (2016), Physical Review B, 94(2), 024434.

[2] Mruczkiewicz, M., Krawczyk, M., & Guslienko, K. Y. (2017), Physical Review B, 95(9), 094414.

[3] Mruczkiewicz, M., Gruszecki, P., Zelent, M., & Krawczyk, M. (2016), Physical Review B, 93(17), 174429.