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CURRENT TOPIC: Topic 3: Spintronics, Magnetization Dynamics, and Micromagnetics

CURRENT SUB-TOPIC: 3.11 FMR and spinwaves dynamics

TITLE: Spin wave propagation in the nanostripes – tuning of dynamical coupling

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Abstract Body: We have explored theoretically 1D magnonic crystals (MCs) and magnonic Fibonacci quasicrystals (MQ) in the form of sequences of infinitely long stripes, magnetically saturated by the external magnetic field directed along the stripe axis. The material parameters and geometry of the studied structures are the same as in Ref. [1]. We have studied the frequency spectrum of spin wave (SW) eigenmodes and their spatial profiles in dependence on the value of the wave vector for propagation along the stripes - $k_{||}$.

We showed the existence of surface states [2] in the band gap regions of spin wave spectra for short MCs in dependence on the value of a tangential component of wave vector $k_{||}$. We will show additionally that with the increase of $k_{||}$, the frequencies of spin waves are decreasing. Moreover, for the SWs of the lowest frequency, the group velocity for the propagation between the stripes v_g is decreasing with the increase of the tangential component wave vector $k_{||}$.

We are observing the widening of the SWs bands while increasing the $k_{||}$. Usually widening of the bands in periodic structures is connected to the increase of the interaction between elements of the structure. We are presenting, for comparison, the additional study of the stripes separated by air gaps. By reducing the distance between two stripes, we enhance the coupling between them. The similar effect of tunable interaction (visible in the change of the bandwidth) is obtained by adjusting the value of $k_{||}$.

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References:

- [1] J. Rychly, J. W. Klos, M. Mruczkiewicz, and M. Krawczyk, Spin waves in one-dimensional bicomponent magnonic quasicrystals, Phys. Rev. B 92, 054414 (2015).
- [2] J. Rychly, J. W. Klos, Spin wave surface states in 1D planar magnonic crystals, J. Phys. D: Appl. Phys., 50, 164004 (2017).

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Attendance at Conference: I acknowledge that I have read the above statement regarding the requirement that an author of this presentation must attend the conference to present the paper.

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