

Forbidden bands in magnonic crystals with nonreciprocal dispersion relation

M. Mruczkiewicz,¹ M. Krawczyk,¹ E.S. Pavlov,² S.L. Vysotskii,²
Yu.A. Filimonov,^{2,3} and S.A. Nikitov^{3,4}

¹*Adam Mickiewicz University in Poznan, Poznan, Poland*

²*Kotelnikov Institute of Radio-Engineering and Electronics of RAS, Saratov, Russia*

³*Saratov State University, Saratov, Russia*

⁴*Kotelnikov Institute of Radio-Engineering and Electronics of RAS, Moscow, Russia*

We have studied experimentally and theoretically the influence of a metal overlayer on the spin wave (SW) dispersion relation in magnonic crystal (MC) made of YIG film with periodically modulated thickness. The measurements of the transmitted SW signal and its phase differences were done with Vector Network Analyzer. The theoretical model was based on the finite element method. The analysis of the phase difference allows for a direct comparison of the calculated and measured dispersion. The obtained results confirm that the shift of the frequency of the forbidden band in spin wave dispersion can be obtained by the presence of the metal layer atop of the MC. This metal layer leads to appearing of exchange Bragg resonances at wavenumbers different from the Brillouin zone edge of the MCs.