PARAMETRIC INSTABILITY OF SURFACE MAGNETOSTATIC WAVES IN 1D FERRITE MAGNONIC CRYSTAL

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9.7 cm

Dispersion of nonlinear spin waves (SW) in ferrite films depends on the amplitude of microwave magnetization $|\vec{m}|$. At sufficiently high level of magnetization amplitude the nonlinear shift in dispersion $\delta k = k(\omega, |\vec{m}_1|) - k(\omega, |\vec{m}_2|)$ is formed ($\vec{m}_1$ and $\vec{m}_2$ correspond to nonlinear and linear propagation of spin waves, respectively).
While linear propagating in ferrite film with surface 1D or 2D periodic structure - magnonic crystal (MC) - interaction of incident SW and SW reflected from surface structure results in formation of forbidden gaps in SW spectra at the frequencies f_n corresponding to k_n satisfied Bragg condition $k = \pi n/d$, where n=1,2,..., d is period of surface structure. At increasing of magnetization level nonlinear shift in dispersion δk leads to shift of f_n. One may expect that further increasing of $|\vec{m}|$ will result in loss of synchronism of the incident and reflected spin waves while propagation along MC.
In this work the influence of the first order (three-magnon) parametric instability of surface magnetostatic wave on the Bragg resonances in 1D ferrite MC was experimentally studied. It was shown that at sufficiently high level of the supercriticality gaps in spin wave dispersion at the frequencies corresponding to Bragg resonance disappear.

13.4 cm

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