SPIN-WAVE RESONANCE IN THE $FeBr_2$ METAMAGNETIC THIN FILM

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The spin-wave resonance (SWR) in the $FeBr_2$ field-induced metamagnetic (FIM) thin film with the (001) surfaces at low temperatures is examined theoretically. The crystal reveals the presence of competing intralayer ferromagnetic exchange coupling (β) and interlayer antiferromagnetic exchange coupling (γ) as well as a strong three-ion anisotropy. A special matrix procedure of solution of the eigenvalue problem for a FIM thin film is developed in order to carry out the SWR intensities. Next, for symmetric boundary conditions the stability diagrams (β, N), (γ, N) (N is the film thickness) and (β, γ) are constructed. It is shown that, when the competing surface exchange parameters are allowed to differ from their bulk values, a full range of the spin-wave qualitative features is observed. The numerical results provide much material for experimental verification by the SWR technique. The stability diagrams together with the absorbtion spectra indicate the area where one should expect surface spin stability when searching for standing spin waves lying in the bulk, surface acoustic or surface optical regime. Moreover, the derived dispersion relations and SWR characteristics allow establishing the conditions for a sample to provide the spectral intensities sufficiently large for experimental detection.

9.7 cm

13.4 cm

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