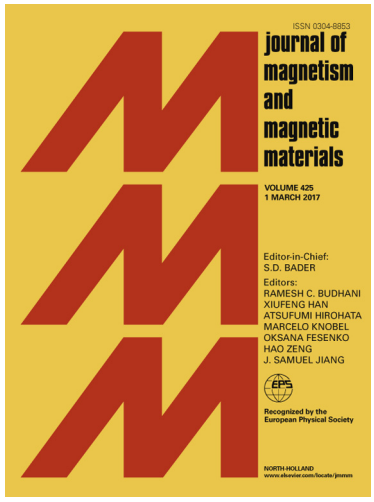

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PII: S0304-8853(17)30065-3
DOI: http://dx.doi.org/10.1016/j.jmmm.2017.03.038
Reference: MAGMA 62561

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 16 January 2017
Revised Date: 10 March 2017
Accepted Date: 21 March 2017

Please cite this article as: R-k. Qiu, W. Cai, Effect of antiferromagnetic interfacial coupling on spin-wave resonance frequency of multi-layer film, *Journal of Magnetism and Magnetic Materials* (2017), doi: http://dx.doi.org/10.1016/j.jmmm.2017.03.038

Effect of antiferromagnetic interfacial coupling on spin-wave resonance frequency of multi-layer film

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Abstract

We investigate the spin-wave resonance (SWR) frequency in a bicomponent bilayer and triple-layer films with antiferromagnetic or ferromagnetic interfacial couplings, as function of interfacial coupling, surface anisotropy, interface anisotropy, thickness and external magnetic field, using the linear spin-wave approximation and Green's function technique. The microwave properties for multi-layer magnetic film with antiferromagnetic interfacial coupling is different from those for multi-layer magnetic film with ferromagnetic interfacial coupling. For the bilayer film with antiferromagnetic interfacial couplings, as the lower (upper) surface anisotropy increases, only the SWR frequencies of the odd (even) number modes increase. The lower (upper) surface anisotropy does not affect the SWR frequencies of the even (odd) number modes. For the multi-layer film with antiferromagnetic interfacial coupling, the SWR frequency of modes m=1, 3 and 4 decreases while that of mode m=2 increases with increasing thickness of the film within a proper parameter region. The present results could be useful in enhancing our fundamental understanding and show the method to enhance and adjust the SWR frequency of bicomponent multi-layer magnetic films with antiferromagnetic or ferromagnetic interfacial coupling.