DP10

Spin Waves in Frromagnetic Co and Ni

J. M. Rejcek[1] and N. G. Fazleev[1,2]

[1]Department of Physics, University of Texas at Arlington, Arlington, TX 76019, USA
[2]Department of Physics, Kazan State University, Kazan 420008, Russian Federation

The spin wave dispersion in ferromagnetic cobalt and nickel has been computed in random phase approximation using the wave vector and frequency dependent magnetic susceptibility including many body enhancement effects. The latter were included using an orbital basis to invert the susceptibility matrices which are encountered in a local density, first principles version of a Stoner like theory of many body enhancements. The complicated computer codes employed in the calculation were tested by computing numerically the wave vector and frequency dependent spin and orbital magnetic susceptibility of the uniform electron gas and comparing with known analytic expressions. Numerical work was done using the analytic tetrahedron method. For cobalt and nickel the theory was simplified by introducing an adjustable parameter in lieu of calculation of complicated integrals involving the band structure. The parameter was adjusted to yield agreement with long wavelength spin wave neutron scattering measurements. With the fit parameter, good agreement with the experimental dispersion of spin waves in cobalt and nickel was obtained for other wavelengths as well.

DP11

Micromagnetic Investigation of the Magnetization Reversal of $Nd_2Fe_{14}B$/α-Fe Trilayers

C. W. Xian, G. P. Zhao*, and Q. X. Zhang

College of Physics and Electronic Engineering, Sichuan Normal University, Chengdu 610066, P. R. China

*Corresponding author: G. P. Zhao , e-mail: zhaogp@uestc.edu.cn

The full magnetization reversal process of $Nd_2Fe_{14}B$/α-Fe Trilayers has been investigated within a micromagnetic method [1] with easy axes perpendicular to the layer plane. Both nucleation and pinning fields as well as hysteresis loops have been calculated reliably as functions of Ls (soft layer thickness) with demagnetization factors considered. In addition, detailed comparison between our results and experimental data [2] has been done.

As shown in Fig. 1, for small L^s, the calculated coercivity is equal to the nucleation field which decreases as L^s increases. In the meantime, the coercivity mechanism varies from nucleation to pinning and the hysteresis loop changes from a square to a slant one. For large L^s, the coercivity is a constant which is close to the pinning field. The experimental coercivity is in between the calculated nucleation and pinning fields. The possible reasons for the difference between the experimental and calculated coercivity have been given.

This work is supported by National Natural Science Fund under contract number 10747007.

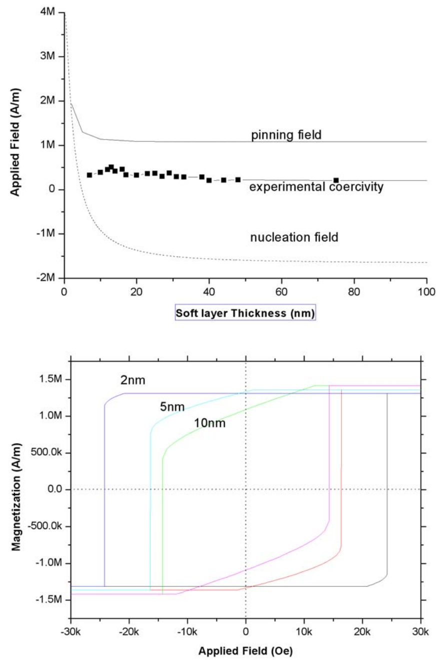

Fig. 1. Critical fields and hysteresis loops.

REFERENCES

[1] G. P. Zhao, X. L. Wang, Phys. Rev. B 74, 012409 (2006).
[2] S. M. Parhofer *et al.*, IEEE Trans. Magn. 32, 4437 (1996).