Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Perturbative magnetoresistance technique used to investigate FM/AF coupled bilayers[1] ALEXANDRE OLIVEIRA, RICARDO DA COSTA, ABNER MELO, CARLOS CHESMAN, Federal University of Rio Grande do Norte — In this study we introduced modifications to a collinear four probe magnetoresistance set-up in order to measure magnetic properties that can only be sensed by techniques based on magnetization perturbation. In addition to the applied DC magnetic field (H_{dc}), in magnetoresistance experiments, a small and quasi-static alternating magnetic field (h_{ac}, less than 10 Oe and around 800 Hz) is applied perpendicularly, both parallel to the sample plane. Due to Zeeman interaction, hac drives sample magnetization to oscillate slightly around its equilibrium position. Although we apply only DC current (few mA), the detected voltage carries DC and AC components. The DC voltage component provides information on magnetoresistance (MR) and the AC component is called perturbative magnetoresistance (PMR). We successfully demonstrated that the PMR signal is proportional to the first derivative of resistance with respect to h_{ac}. Using this technique and a phenomenological model that takes into account the relevant free energy terms of FM/AF coupled bilayers, we were able to study reversible and irreversible magnetization rotation processes in these magnetic systems. With respect to magnetic anisotropy, we investigated rotatable anisotropy, proposed by McMichael *et al* [1] and Geshev *et al* [2]. [1] R. D. McMichael, M. D. Stiles, P. J. Chen, and W. F. Egelhoff, Jr., Phys. Rev. B, 58, 8605 (1998); [2] J. Geshev, L. G. Pereira, and J. E. Schmidt, Phys. Rev. B, 66, 134432 (2002).

[1]Financial support: CNPq, FAPERN and CAPES (Brazilian agencies).

Alexandre Oliveira
Federal University of Rio Grande do Norte

Date submitted: 14 Nov 2013 Electronic form version 1.4