Abstract Submitted for the MAR14 Meeting of The American Physical Society

Dipole-exchange modes in transversely magnetized ferromagnetic stripes¹ RODRIGO ARIAS, Universidad de Chile, ZHENG DUAN, ILYA KRIVO-ROTOV, University of California, Irvine — We present a theory of dipole-exchange modes in transversely magnetized ferromagnetic stripes of rectangular cross sections: a comparison is made with experimental results on Permalloy stripes. The model applies to very thin stripes (of the order of the exchange length): the magnetization is considered uniform over their thickness, and we consider modes of long wavelength along the longitudinal direction of the stripes. An applied magnetic field saturates the stripes along the transverse direction, and we also consider the effect of the exchange and dipolar fields. Under these assumptions we obtain the frequencies and shapes of the modes either considering free or pinned boundary conditions. We obtain good agreement with measurements of the frequency spectra in Permalloy nano wires of several rectangular cross sections: this happens for modes with appreciable amplitude throughout the samples. There is frequency disagreement for edge modes due to limitations of the model, since the effects of roughness, corners and imperfections at the edges of the samples are quite relevant in this case.

¹This work was supported by the NSF Materials World Network Program Grant No. DMR-1210850 and by DOE grant DE-FG02-84ER45083. Also, supported by "Proyecto ICM FP10-061-F-FIC", and "Proyecto FONDECYT 1130192, Conicyt, Chile"

Rodrigo Arias Universidad de Chile

Date submitted: 13 Nov 2013

Electronic form version 1.4