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Distribution of non-adiabatic and adiabatic torques in domain wall systems ELIZABETH GOLOVATSKI, Dept. of Physics, Luther College, MICHAEL FLATTÉ, OSTC and Dept. of Physics and Astronomy, University of Iowa — Spin torque and the subsequent motion of domain walls caused by coherent carrier transport[1] is an important aspect in the development of spintronic devices[2]. We model spin torque in Néel walls[3] in various configurations using a piecewise linear transfer-matrix method[4] and calculate the spin torque distribution[5] throughout the system. We find a large non-adiabatic component to the spin torque throughout the system, that oscillates with position in the wall, as if it would introduce an out-of-plane twist in the magnetization. This twisting effect is especially pronounced in a domain sandwiched between two domain walls, where the non-adiabatic torque increases almost linearly from a large negative value to a large positive value across the domain. We also note differences in the adiabatic torques across materials: ferromagnetic semiconductors have symmetry of the adiabatic torques around the wall center that is lost when considering a magnetic metal. Work supported by an ARO MURI. [1] M. Yamanouchi et al., Nature 428, 539 (2004) [2] S. Parkin et al., Science 320, 190 (2008) [3] G. Vignale and M. Flatté, Phys. Rev. Lett. 89, 098302 (2002) [4] E. Golovatski and M. Flatté, Phys. Rev. B, 84, 115210 (2011) [5] J. Xiao et al., Phys. Rev. B, 73, 054428 (2006)

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