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Distribution of domain wall spin torque in magnetic metals and ferromagnetic semiconductors ELIZABETH GOLOVATSKI, Dept. of Physics, Luther College — The design and implementation of many spintronic devices[1] will be dependent on good models of spin torque and domain wall motion caused by coherent carrier transport[2]. We model spin torque in Néel walls[3] using a piecewise linear transfer-matrix method[4], and calculate the spin torque distribution[5] throughout the system. We examine the differences in spin torque for ferromagnetic semiconductors (where the Fermi energy is much less than the spin splitting) and magnetic metals (where the Fermi energy is much greater than the spin splitting). We find that the torque distribution is more asymmetric for adiabatic torques and more symmetric for non-adiabatic torques in a magnetic metal vs. a ferromagnetic semiconductor, leading to differences in velocities for two domain walls in close proximity. [1] S. Parkin et al., Science 320, 190 (2008) [2] M. Yamanouchi et al., Nature 428, 539 (2004) [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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