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Modification of Spin Wave Propagation by Current Injection

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We studied the effect of an electric current on the spin wave propagation in magnetic wires, and found the following two effects. (i) Current injection changes the velocity of spin wave; the velocity is increased or decreased depending on the current polarity. (ii) Current injection modifies the attenuation length of spin wave; the attenuation length of spin wave can increase when the spin waves and electrons move in the same direction. The first finding can be interpreted as the time-domain observation of the spin-wave Doppler shift by current injection [1]. The second effect is thought to be affected by the nonadiabaticity of the spin transfer torque and thus can be used to estimate the nonadiabaticity [2].

[1] V. Vlaminck and M. Bailleul, Science 322, (2008) 410.
[2] S. M. Seo, K. J. Lee, H. Yang, and T. Ono, Phys. Rev. Lett. 102, (2009) 147202.