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Highly-coherent magnetic vortex oscillations driven by a dc spin-polarized current V.S. PRIBIAG, G.D. FUCHS, P.M. BRAGANCA, O. OZATAY, J.C. SANKEY, D.C. RALPH, R.A. BUHRMAN, Cornell University, I.N. KRIVOROTOV, U.C. Irvine — While it has been demonstrated that dc spin-polarized currents can drive microwave spin-wave oscillations in magnetic multilayers via the spin-transfer torque (STT) effect [1], little is known about persistent STT-driven oscillations in strongly non-uniform systems. We report the use of STT to excite steady-state gigahertz-frequency oscillations of a magnetic vortex. We use an elliptical Py-Cu-Py nanopillar spin-valve structure in which one of the Py layers is sufficiently thick that its magnetization assumes a vortex configuration. The oscillations, which can be obtained in essentially zero applied field, are highly coherent, with full-widths at half maximum of less than 300 kHz at room temperature being obtained under certain bias conditions. We will discuss the observed sensitivity of the oscillation line-width to magnetic defects. We will also present measurements of the temperature-dependence of the oscillations, which we are pursuing to obtain a more complete understanding of how magnetic imperfections and thermal fluctuations determine the performance of this new type of nanomagnetic STT oscillator. We will also discuss the use of STT-driven ferromagnetic resonance to examine the various magnetic modes that can be present in these nanoscale vortex structures.
[1] S. I. Kiselev *et al.*, *Nature* (London) **425**, 380 (2003).

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