Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Current-Hysteretic Low Frequency Oscillations in Spin-Transfer Nanocontacts MATTHEW PUFALL, WILLIAM RIPPARD, MICHAEL SCHNEIDER, THOMAS SILVA, STEPHEN RUSSEK, National Institute of Standards and Technology, 325 Broadway, Boulder, CO 80305 — We have observed spin-transfer-driven large amplitude, current hysteretic, low frequency (< 500 MHz) oscillations in nanocontacts made to spin valve structures. The oscillations occur only for small ($<$50 Oe) in-plane applied fields, but persist in fields up to several kOe for out of plane fields. The frequency of oscillation is typically far below the uniform-mode ferromagnetic resonance frequency, and is only a weak function of applied field. Hysteresis in the presence/absence of the oscillations is observed with dc current, with oscillations first appearing at high currents with increasing current, but persisting to lower currents upon decreasing the current. We suggest that these observations are consistent with dynamics of a vortex-like state in the vicinity of the contact, one nucleated by the Oersted fields generated by the dc current, and with dynamics driven by the spin transfer torque. The electrical oscillation amplitudes are large, with the largest amplitudes approaching 1 mV, and are narrowband, with many devices exhibiting sub-megahertz linewidths.

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Date submitted: 20 Nov 2006 Electronic form version 1.4