Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Phase locking of a spin-torque nano-oscillator to a strong microwave magnetic field ANDREI SLAVIN, VASYL TYBERKEVYCH, Department of Physics, Oakland University, Rochester, MI, PHIL TABOR, SERGEI URAZHDIN, Department of Physics, West Virginia University, Morgantown, WV — Magnetization precession excited by spin transfer effect in a current-driven spin-torque nano-oscillator (STNO) can be phase-locked to an external microwave signal having frequency f_e close to the frequency f_0 of the STNO precession. In previous studies, only the phase-locking of STNO to a microwave *current* was observed. In this work we studied experimentally STNO phase-locking to a microwave *magnetic field* having amplitude h_e up to 20 Oe rms. We observed both main ($f_e/f_0 = 1$) and secondary ($f_e/f_0 = 2$) locking regimes. For sufficiently large driving field h_e both regimes of the STO phase-locking become hysteretic, with the boundaries of the locking interval dependent on the direction of the sweep of the external frequency f_e. The bandwidth of the main ($f_e/f_0 = 1$) locking regime was larger than the bandwidth of the secondary ($f_e/f_0 = 2$) regime when the dc bias magnetic field was perpendicular to the microwave field h_e. In contrast, for parallel orientations of dc and microwave magnetic fields, the secondary synchronization regime was more pronounced.

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Date submitted: 20 Nov 2009 Electronic form version 1.4