Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Spintronic Oscillator based on feed-back mechanism ASHWIN TULAPURKAR, Department of Electrical Engineering, Indian Institute of Technology-Bombay, Mumbai, India, DINESH DIXIT, Department of Physics, Indian Institute of Technology-Bombay, Mumbai, India, KATSUNORI KONISHI, Graduate School of Engineering Science, Osaka University, Osaka, Japan, C. TOMY, Department of Physics, Indian Institute of Technology-Bombay, Mumbai, India, YOSHISHIGE SUZUKI, Graduate School of Engineering Science, Osaka University, Osaka, Japan
— Nano-scale rf oscillators based on the magnetic tunnel junctions is an active area of research. These oscillators are based on the spin-transfer torque effect, in which a dc current drives the magnetization into precessional motion. Here we present a novel design of a spintronic oscillator which is not based on spin-transfer torque effect. This new oscillator is comprised of a magnetic tunnel junction whose top and bottom contacts are connected to a bias-T. A dc current is passed through the low frequency port of the bias-T and the high frequency port is connected to a "feed-back" wire which runs below the MTJ. Any fluctuation in the magnetization direction of the free layer of MTJ, drives ac current through the feed-back wire, which in turn exerts ac magnetic field on the free layer. The feedback wire is oriented such that the ac magnetic field amplifies the magnetization fluctuations for positive value of dc current. For negative value of dc current, the feedback loop suppresses the fluctuations. We find that if the positive dc current passing through the MTJ is more than a critical value, continuous precessing states of the magnetization are possible. Oscillators with better quality factors are possible using the feedback scheme.

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Date submitted: 22 Dec 2011 Electronic form version 1.4