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Enhanced nanomagnet spin-transfer-toque reversal through strain-induced meta-stable magnetization initialization NICKVASH KANI, AZAD NAEEMI, Georgia Institute of Technology — Nanomagnet reversal through constant longitudinal spin currents is typically a slow and energy intensive process due to the fact that only the transverse component of the spin current applies a toque on the nanomagnet and hence, this torque is very small if the magnetization is initially along the free-axis. Recent research has shown that a piezoelectric material can be placed under a nanomagnet and introduce a strain-induced anisotropy initializing the magnetization to any orientation. It has been previously shown that the probability that a nanomagnet will reverse to the parallel energy basin under a constant spin current is a single exponential function and that regardless of initial magnetization, the spin current magnitude must be greater than the critical current value to ensure reliable coupling. However, strain-induced magnetization initialization can provide some energy savings when reversing the nanomagnet. It is shown that in the meta-stable (y) initialization case, reliable reversal is achieved for very small current pulses. Hence, initializing nanomagnets to a meta-stable state through piezo-electric materials can be a useful method for developing fast and energy efficient spin-based devices.

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