

Micromagnetic simulations of a spin-torque oscillator reader

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Spin-torque oscillators (STOs) have been proposed as candidates for magnetic field sensors for hard disk drive (HDD) purposes because of their potential high spatial resolution, energy efficiency and frequency resolution [1]. However, their practical implementation has been hindered by a potential vulnerability to noise. We investigate a novel two-bit STO reader configuration, which could allow for simultaneous detection of two independent magnetic fields originating from adjacent HDD bit tracks, resulting in faster readout as well as bigger size of the device and thus increased resilience to noise. We conduct micromagnetic simulations of an example system and find that the magnetization response to a non-uniform field remains unimodal with respect to frequency. We investigate the STO frequency dependence on the values of both external fields and perform a successful two-tracks readout simulation.

References:

[1] Chęciński, J., et al., Magnetics, IEEE Transactions on, DOI: 10.1109/TMAG.2016.2611652 (2016).

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