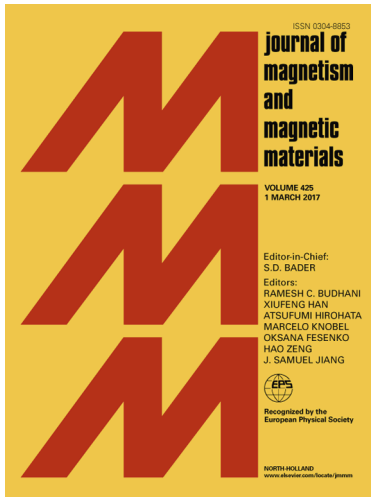

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Abstract

Micromagentic simulation for detecting magnetic nanobeads is performed by using spin torque oscillation as the detector. The non-uniform stray field generated by magnetic beads can induce a detectable frequency shift of a spin torque oscillator. Simulations indicate that an 80-nm-diameter magnetic bead can be detected with a frequency shift of 1.2 GHz and a maximum linewidth of 28 MHz. Due to the non-uniform stray field, the frequency shift and linewidth vary with the bead position. For multiple beads detection, the oscillation frequency is linear with the number of 40-nm-diameter beads, namely 0.16 GHz/bead on average.