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Spin torque and critical currents for magnetic vortex nano-oscillator in nanopillars

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We calculated the main dynamic parameters of the spin polarized current induced magnetic vortex oscillations in nanopillars, such as the range of current density, where a vortex steady oscillations exist, the oscillation frequency and orbit radius. We accounted for both the non-linear vortex frequency and non-linear vortex damping. To describe the vortex excitations by the spin polarized current we used a generalized Thiele approach to motion of the vortex core as a collective coordinate. All the calculation results are represented via the free layer sizes, saturation magnetization, Gilbert damping and the degree of the spin polarization of the fixed layer. Predictions of the developed model can be checked experimentally.

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