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Spin Troque Driven Anti-vortex Dynamics in Patterned Nanomagnets MUSTAFA METE, AHMET COSKUNER, ALI TAHA HABIBOGLU, VEDAT KARAKAS, YEMLIHA BILAL KALYONCU, AISHA GOKCE, OZHAN OZATAY, Bogazici University, ANNA GIORDANO, MARIO CARPENTIERI, University of Calabria, GIOVANNI FINOCCHIO, University of Messina, FEDERICA CELEGATO, CNR-Institute of Materials for Electronics and Magnetism , PAOLA TIBERTO, Istituto Nazionale di Ricerca Metrologica — Recent studies have shown that unconventional spin configurations in patterned nanomagnets like vortices are potentially applicable to ultrafast memory, rf oscillators and detectors utilizing the static and dynamic response of these structures under external magnetic field and current bias. Due to the difficulties of stabilizing an isolated anti-vortex, there is still much to be explored about the static and dynamic properties of such spin structures. In this study, we report on our investigation of stable anti-vortex formation conditions and the subsequent magnetic field/dc current driven excitations. Permalloy based asteroid geometry devices exhibit anti-vortex nucleation at the center with the application of an in-plane AC demagnetizing field and an out of plane magnetic field. Changes in the stable localization of the spins immediately motivates the characterization of the dynamic response to the application of spin torque from a spin-polarized current as sensed using the anisotropic magnetoresistance effect (AMR). We will present the field and current dependence of the anti-vortex gyration frequency, the bandwidth and power in the asteroid devices. This work allows the evaluation of anti-vortex structures to be utilized in practical on-chip microwave oscillators.

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