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Spin Torque induced anti-vortex excitations KAAN OZBOZDUMAN, VEDAT KARAKAS, SEVDENUR ARPACI, ALI TAHA HABIBIOGLU, AISHA GOKCE, Bogazici Univ, ANNA GIORDANO, University of Messina, FEDERICA CELEGATO, Institute of Materials for Electronics and Magnetism , PAULA TIBERTO, Istituto Nazionale di Ricerca Metrologica, GIOVANNI FINOCCHIO, University of Messina, GULEN AKTAS, OZHAN OZATAY, Bogazici Univ
— Nanodevices that are designed to stimulate the formation of unique magnetic configurations (vortex, anti-vortex, skyrmion etc.) are applicable to spin based technologies, namely, microwave oscillators and magnetic sensors. In this talk, we report the observed dynamic behavior of an anti-vortex, which had not been thoroughly studied due to the complexity in stabilization of the structure, by analyzing its interaction with magnetic field and DC current. Permalloy ($Ni_{81}Fe_{19}$) based $2x2m^2$ asteroid geometry devices, consisting of four tangent circles of equal radii, facilitate the nucleation of an anti-vortex pair at the center with the application of an in-plane AC demagnetizing field and an out of plane magnetic saturation field. Magnetic force microscopy (MFM) data shows that an external magnetic field can rearrange the positions of diagonally located anti-vortex pair. Spin torque effect induces an anti-vortex pair circular motion, known as gyration. The resulting RF signal is measured using the anisotropic magneto-resistance effect (AMR) which indicates a ˜250-300 mΩ change in the resistance of our samples. This study will help develop our understanding of the anti-vortex, current and magnetic field interactions for practical on-chip microwave oscillator applications.

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