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High frequency spin dynamics in soft magnetic dots in biased vortex state: precise probing and nature of the eigenmodes[1] FARKHAD ALIEV, JUAN FRANCISCO SIERRA, AHMAD AWAD, Universidad Autonoma de Madrid, GLEB KAKAZEI, Universidade do Porto, DONG-SOO HAN, Seoul National University, SANG-KOONG KIM, KONSTANTIN GUSLIENKO, Seoul National University, BOJAN ILIC, Cornell University, VITALI METLUSHKO, University of Illinois at Chicago — Regular arrays of soft magnetic dots in the vortex state are being considered as a potentially new high-density nonvolatile recording media characterized by two binary properties: chirality and polarity of magnetic vortex core. Here we unambiguously demonstrate the existence of two distinct dynamic vortex (stable and metastable) regimes with qualitatively different spin wave eigenmodes. We find that dynamic response in the metastable vortex state qualitatively changes with relative orientation of the driving rf and bias magnetic fields. These findings, supported by numerical simulations, open new possibilities for development of magnetic devices with precise control over the magnetization switching process. They also underscore importance of understanding of dynamic response in different nanostructured materials with vortices in confined and stratified conditions.

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