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Effect of size on spin-transfer-driven ferromagnetic resonance in nanoscale magnetic tunnel junctions ZHONGMING ZENG, KWUN HUNG CHEUNG, HONGWEN JIANG, Department of Physics & Astronomy, University of California, Los Angeles, 90095 , ILYA KRIVOROTOV, Department of Physics & Astronomy, University of California, Irvine, California 92697, J.A. KATINE , Hitachi Global Storage Technologies, San Jose, California 95135, USA — Recently spin-transfer-driven ferromagnetic resonance (ST-FMR) has been explored to investigate the spin dynamics in various magnetic structures. For ST-FMR in a magnetic tunnel junction, an RF current at ferromagnetic resonance generates a sizable DC voltage across the tunnel junction [1], which provides a simple, yet effective means, to electrically detect the spin dynamics of the nanoscale free layer magnetization. In this talk, we present our measurements of ST-FMR for a set of MgO-based nanopillar magnetic tunneling junctions of different pillar aspect-ratios and sizes ranging from 65nm x 50nm to 170nm x 90nm. These data provide useful information to analyze the spin dynamics properties, such as damping and resonance conditions. Specifically, we found a strong dependence of the FMR condition on the cell size. Pronounced asymmetry in the spectra shape was observed for larger cells. The results may shed some light on boundary conditions for dipole-exchange spin waves in thin-film nanomagnets.[1]A. A. Tulapurkar et al., Nature 438, 339 (2005).

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