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Microwave oscillations in magnetic tunneling junctions with perpendicular anisotropy in the absence of bias magnetic field[1] RAJAPAKSAYALAGE RAJAPAKSE, Univ of California - Los Angeles, ZHONGMING ZENG, Suzhou Institute of Nano-tech and Nano-bionics, Chinese Academy of Sciences, HONGWEN JIANG, Univ of California - Los Angeles — Microwave oscillators based on spin-transfer-torque are emerging as promising high-frequency spintronic devices. We report our investigation of microwave generation and spin dynamics of magnetic tunneling junctions with perpendicular anisotropy. For our experiments, a Fe-rich free layer is used in the magnetic film stack to enhance the perpendicular anisotropy. Circular shaped nano-pillar is patterned to induce a magnetic vortex state. We find that our devices produce stable microwave oscillations for frequencies up to 5 GHz in zero bias magnetic field. The threshold DC current for microwave emission as well as the spectra linewidth are considerably smaller than that of the in-plane MTJ structures. The current dependence of the frequency is almost symmetric about both current directions. We will also report the effects of parametric excitation in our devices using microwave current injection.

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