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Determining Conditions for Microwave-Frequency Gain in Magnetic Tunnel Junctions LIN XUE, CHEN WANG, YONG-TAO CUI, R. A. BUHRMAN , D. C. RALPH, Cornell University — Spin transfer torque from a microwave current flowing through a magnetic tunnel junction (MTJ) can excite resonant magnetic dynamics and hence a resonant resistance oscillation. When an additional DC current is applied to the device, the MTJ produces an oscillating voltage at the same frequency as the input microwave signal. This oscillating voltage increases with DC bias and can become larger than the input signal, thereby providing gain near the magnetic resonance frequency. We have investigated this phenomenon both theoretically and by measuring the high-frequency response of MTJs using network analyzer measurements. We will report the device parameters that are required to achieve gain and discuss the implications of our measurements for determining the magnitude and direction of the spin torque in MTJs at high bias.

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