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High Voltage Pulse Measurements of Microwave Emission and Spin-Torque Effects in Magnetic Tunnel Junction H.W. TSENG, Y. LI, Cornell Univ., J.A. KATINE, HGST, San Jose, CA, P.G. GOWTHAM, D.C. RALPH, R.A. BUHRMAN, Cornell Univ. — The character and strength of the in-plane and field-like spin transfer torque (STT) components in magnetic tunnel junctions at high bias voltages are crucial to the successful utilization of MTJs in STT MRAM. If the field-like torque (FLT), which is generally found to be symmetric with respect to bias direction for moderate voltages, $<$ $\pm$ 0.5 V, is too large it could result in unreliable switching (back-hopping) for negative bias voltage pulses (anti-parallel to parallel switching). Here we discuss pulse measurements of MgO MTJs at high bias that yield important information about the FLT component in the $\pm$ 0.5 to 1.0 V regime through analysis of both the thermally-excited FMR behavior and spin torque driven oscillations. In the structures studied we find a strong and highly asymmetric voltage-dependent FLT at high bias that under some field and voltage conditions can result in large amplitude, incoherent microwave dynamics that could have a strong effect in enhancing back-hopping. We will analyze possible mechanisms, including junction asymmetries and inelastic tunneling.

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