

Bias Dependences of Longitudinal and Transverse Spin Transfer Torque in MgO-based Magnetic Tunneling Junction

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We investigate the bias dependences of longitudinal and transverse spin transfer torques by employing magnetic noise measurement in a magnetic tunneling junction. The measured power spectra densities of magnetic noise are successfully analyzed by the fluctuation-dissipation theorem with an imaginary part of transverse susceptibility including spin transfer torque contributions. We find that the longitudinal component is a linear function of the bias voltage, while the transverse component has a quadratic dependence.