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Spin-torque-driven ferromagnetic resonance in a nonlinear regime[1] WENYU CHEN[2], G. DE LOUBENS[3], J-M. L. BEAUJOUR, Dept. of Physics, NYU, J. Z. SUN, IBM T.J. Watson Research Center, A. D. KENT, Dept. of Physics, NYU — Spin-torque-driven ferromagnetic resonance (ST-FMR) is a quantitative tool for studying spin-transfer interactions in nanojunctions. Using this method we have studied Co/Cu/CoNi spin valves, in which the CoNi synthetic free layer has perpendicular magnetic anisotropy. Perpendicular field swept resonance lines were measured under a large amplitude GHz current excitation, which drove ST-FMR into a nonlinear regime and produced a large angle precession of the free layer magnetization. With increasing rf power, the resonance lines deviate from a Lorentzian shape and became asymmetric, with a lower resonance field and a larger linewidth. A non-hysteretic step jump in ST-FMR voltage signal was also observed at high powers. The comparison of the experimental results to the foldover and the nonlinear damping theories will be presented.

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