CURRENT INDUCED SWITCHING DUE TO SPIN-TRANSFER IN SPIN VALVES: MACROSCOPIC MODEL

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9.7 cm

We develop a macroscopic description of current-induced torque due to spin transfer in layered systems consisting of ferromagnetic films separated by a nonmagnetic layer. The description is based on the classical spin diffusion equations for the distribution functions inside the films used in the theory of CPP-GMR, and macroscopic boundary conditions for the longitudinal and transverse components of the spin current. Due to strong exchange field in ferromagnetic films, we assume that the perpendicular component of spin current is totally absorbed within the narrow interface region giving rise to the torque. Our model can be used to describe normal and inverse switching phenomena studied in recent experiments. We also present conditions, at which the steady precession states above certain critical current should occur.

13.4 cm

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