Current-pulse-induced switching of symmetric and asymmetric spin valves

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9.7 cm

Spin-polarized current can transfer spin angular momentum from conduction electrons to localized magnetic moments and generate magnetic switching and magnetic excitations. This phenomenon is important for its wide range of technological applications, including magnetic memory and magnetic sensors. By this reason designing of new bistable devices able to be fast switched by electric current as well as thorough understanding of the current-induced spin dynamics are needed. Therefore, we have performed relevant dynamical study of the standard spin valve Py/Cu/Py and the asymmetric one Co/Cu/Py, both connected to Cu electrodes. The dynamics has been described in terms of the macrospin model, using the generalized Landau-Lifshitz-Gilbert equation. The thermal effects have been considered and modelled by an additional stochastic magnetic field. The spin transfer torque has been calculated in the diffusion transport limit. Detailed dependence of switching properties of examined pillars on the relevant current-pulse parameters has been obtained.
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