Current-induced magnetic dynamics in ferromagnetic single-electron devices

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Current-induced dynamics of a magnetic moment of the central electrode in a ferromagnetic single-electron transistor is considered theoretically. The spin-transfer torque due to spin current absorbed by the central electrode is calculated numerically in the sequential tunneling regime. Spin accumulation in the central electrode has been taken into consideration. Such spin relaxation appears in the limit of slow spin relaxation. The description and numerical calculations are limited to the in-plane component of the spin torque, assuming that the out-of-plane component of the spin torque is small and therefore can be omitted. Dynamics of the magnetic moment of central electrode is described by the Landau-Lifsitz-Gilbert equation, which includes the torques due to magnetic field (external and internal), damping processes, and spin current. The time evolution of the magnetic moment has been obtained by integrating numerically the Landau-Lifsitz-Gilbert equation. The conditions which are necessary for switching the magnetic moment are also discussed.

9.7 cm

13.4 cm

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