Abstract

We present tight-binding calculations of the current-induced spin torque in non-collinear magnetic tunnel junctions based on the non-equilibrium Green function (Keldysh) approach. The spin torque is calculated both via the effective local magnetic moment approach and from the divergence of the spin current. We show that both methods are equivalent, i.e. the absorption of the spin current at the interface is equivalent to the exchange interaction between the electron spins and the local magnetization. Torque behavior in the FM layer under applied bias is investigated. We have implemented this Keldysh approach for both one and three dimensions.

Conclusion:

• The transverse components of the spin torque parallel and perpendicular to the interface oscillate with different phase describing electron spin precession around the exchange field in the FM layer.

• In absence of applied bias, the component of the spin torque perpendicular to the interface is non-zero and represents the exchange coupling between the FM layers across the barrier.