Abstract:

The spin-flip transmission of electrons through a single and double path ferromagnetic domain wall is studied theoretically. In the domain wall, the electron spin is coupled with the localized spins according to the $xy$ model interaction. In the case of single path, the flying spin follows the rotation of the localized spins adiabatically, and the spin-flip transmission occurs for all over the band width. In the case of double-path model in which the rotation angle of the localized spins are opposite each other, the transmission of the flying spin is strongly suppressed due to the destructive interference of the Berry phase of the spins. The persistent current flows circularly in the double paths.