Transport through Inhomogeneous Magnetization Textures - Domain-Wall Resistance

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We use the Keldysh Greens function formalism to derive transport equations for conducting magnetic materials with a ferromagnetic order parameter that can be inhomogeneous in space and time. Spin-flip scattering at magnetic impurities is also included. We consider a contact with a quasi one-dimensional geometry, in which the current flows in the same direction as the magnetization gradient of a single domain wall. In the diffusive regime and in the limit of walls much longer than the spin-diffusion length, it is possible to obtain analytical results for the domain-wall resistance which can also become negative. Our results differ from previous works, which used different theoretical frameworks like Kubo formula.

9.7 cm

13.4 cm

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