Effects of the in-plane magnetization on the conductance properties of the topological insulator ferromagnet/insulator/superconductor junctions

R. Vali, Mehran Vali
School of Physics, Damghan University, Damghan, Iran

We investigate theoretically the effects of the in-plane magnetization on the tunneling conductance of a ferromagnet/insulator/superconductor (F/I/SC) junction formed on the surface of a three dimensional topological insulator. The in-plane magnetization shifts the electron and hole Fermi surfaces in ferromagnetic layer and thus influences the Andreev reflection and tunneling conductance. The shifts of electron and hole Fermi surfaces are in opposite directions and thus the Andreev reflection, and consequently the tunneling conductance, decreases with increase of the in-plane magnetization. We also investigate the effect of the in-plane magnetization on the barrier strength dependence of the tunneling conductance. We find that the tunneling conductance as a function of barrier strength displays a π periodic oscillatory behavior, whose mean value and amplitude depend on the in-plane magnetization in addition to the bias voltage.