Resonant control of magnetization in φ_0-junction shunted by an LC-circuit

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The anomalous Josephson effect consists of the occurrence of a phase shift φ_0 associated with the component of magnetization, in the current-phase relationship of the superconductor/ferromagnet/superconductor (S/F/S) Josephson junction (JJ)[1, 2], well known as the φ_0-junction. The possibility of controlling magnetic properties with a superconducting current, as well as the influence of magnetic dynamics on superconductivity makes φ_0-junction promising object of superconducting spintronics. An important place is occupied by research into various methods of controlling magnetization, in particular through ferromagnetic resonance [3, 4], as well as an external current pulse [5] or magnetic field pulse [6], which makes possible development of cryogenic memory [7].

In this work we suggest new approach to magnetization control in φ_0-junction shunted by LC elements and perform investigation of the dynamics of the mentioned system based on numerical modeling. We have shown numerically and analytically, that the resonance in the LC-circuit leads to a deviation of magnetization from the ferromagnetic easy axis. The obtained result makes it possible to control of magnetization through the resonance in the LC circuit.

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