Properties of Buzdin steps in ϕ_0 Josephson junction

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The ϕ_0 superconductor-ferromagnet-superconductor Josephson junction exhibits unique locking phenomena under external periodic signal when both magnetic and electric components are taken into account [1]. Due to the coupling of superconductivity and magnetism in this system, the magnetic moment precession of the ferromagnetic layer caused by the magnetic component of external radiation can lock the Josephson oscillations, which results in the appearance of a particular type of steps in the current-voltage characteristics, completely different from the well-known Shapiro steps. The influence of the amplitudes of both components as well as the driving frequency of external radiation on the locking is analyzed in detail. Contrary to the well-known Shapiro steps, the Buzdin steps possess very different properties, such as amplitude and frequency dependence, that are indications of their unique origins and locking mechanisms.

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References

[1] Yu. M. Shukrinov, E. Kovalenko, J. Tekic, K. Kulikov, and M. Nashaat *Buzdin, Shapiro, and chimera steps in Phi-0 Josephson junctions* Phys. Rev. B, **109**, 024511 (2024)