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Effect of the magnetic component of electromagnetic radiation on the Josephson φ0 transition

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This paper investigates the effect of the magnetic component of microwave radiation on the dynamics of the electric current and magnetization of the Josephson junction φ0. Previous studies show that exposure of SFS junctions to radiation leads to a number of interesting phenomena that can be utilized in future electronic devices. We have used the Landau-Lifshitz-Hilbert equation and the resistive-capacitance shunt transition model to describe the coupled dynamics of the ferromagnetic magnetic moment and electric current in the presence of external radiation. The resulting system of nonlinear equations has been investigated numerically. It is shown that the magnetic component of external radiation leads to the appearance of integer and semi-integer current steps in the IV characteristics, splitting of the magnetization resonance peaks and the appearance of new frequencies in the magnetization dynamics spectrum. A dip in the resonance magnetization curve, the area of which coincides with the current step in the IV characteristic, is also observed. The mechanism of magnetic moment precession and IV characteristics at different parameters of φ0 transition and microwave radiation are investigated.

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