9. Simulation of a controllable magnetization reversal in a chain of Phi-0 junctions by an ac voltage pulse

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In Phi-0 Josephson junctions, the spin-orbit interaction in a ferromagnet layer provides a mechanism for direct coupling between the magnetization and the superconducting current, which makes it possible to control the magnetic properties by means of the Josephson current, as well as he effect of magnetization on the Josephson current. Recently, the possibility of developing cryogenic memory based on the magnetization reversal in the Phi-0 junction has been studied [1, 2]. However, when using several Phi-0 junctions in a single chip, it becomes necessary to realize he magnetization reversal in a selected Phi-0 junction. We propose a solution to this problem based on mathematical modeling of the dynamics of a system consisting of three Phi-0 junctions connected via LCR-circuits, which is reduced to solving the Cauchy problem. It is shown that by applying an AC external voltage pulse with a frequency coinciding with the eigenfrequency of the LCR-circuit, it is possible to realize the magnetization reversal in a selected Phi-0 junction, i.e., the possibility of controlled reversal of magnetization is demonstrated. The influence of system parameters on the dynamics of magnetization in each of the Phi-0 junction is studied in detail. We have developed a software module for the performed calculations. The developed materials are publicly available on the ML/DL/HPC ecosystem of the HybriLIT platform (LIT JINR) [3] in the form of electronic books Jupyter Book [4, 5].

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