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Quantum entanglement and dynamical Lamb effect for two superconducting qubits in a nonstationary cavity[1] OLEG BERMAN, ROMAN KEZERASHVILI, New York City College of Technology, University of New York (CUNY), YURII LOZOVIK, Institute of Spectroscopy, Russian Academy of Sciences — We consider the realistic physical realization to observe the quantum entanglement and the dynamical Lamb effect (DLE) for two artificial atoms, formed by superconducting qubits connected with superconducting line, which plays a role of an optical cavity, with varying boundary conditions. The DLE is a novel effect of nonstationary cavity quantum electrodynamics, which is photonless, parametric excitation of an atom, embedded in a nonstationary cavity, by shaking its photonic coat due to nonadiabatic change of the boundary conditions for virtual photons. The quantum entanglement and the probability of the DLE were evaluated for two qubits, coupled to the superconducting line, caused by nonadiabatic fast change of the boundary conditions. The quantum entanglement under consideration is not caused by interaction between two qubits, but due to change of boundary conditions of the cavity. As a measure of the dynamical quantum entanglement, the conditional concurrence of two qubits for each fixed number of created photons in a nonstationary cavity is derived and analyzed. The DLE and quantum entanglement of two qubits due to the change of cavity boundary conditions offer a new possibility of control of qubits.

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