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Death of entanglement of two Josephson vortex qubit due to the dissipation effect RAMESH DHUNGANA, ISAAC O'BRYANT, JU KIM, University of north Dakota — We investigate the effects of the dissipation on the two entangled Josephson vortex qubits (i.e. JVQ) using spin-boson model. It has been suggested that the decoherence time for a JVQ can be long at ultra-low temperature because it couples only weakly to the sources of decoherence. The entanglement of two JVQs due to the magnetic induction effect between two long Josephson junctions and their coupling to a single mode resonant cavity may be destroyed due to the same source of decoherence, which are present in the environment. We consider the decoherence effect on the JVQ system by using a dissipative thermal bath. We estimate its effect on entanglement, which can be measured in terms of concurrence, to show that the entanglement may die down quickly due to this decoherence source. We compare the time scale for entanglement survival of two JVQs in the dissipative environment with the decoherence time for a single JVQ qubit and discuss its effect on the two qubit operation.

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