

## Quantum Dynamics of Two Capacitively Coupled Superconducting Islands via Josephson Junctions

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**Abstract:** In this paper, we consider a system consisting of two capacitively coupled superconducting islands via Josephson junctions. We show that it can be reduced to two coupling harmonic oscillators under certain conditions, and can be solved exactly in terms of a displacing transformation, a beam-splitter-like transformation, and a squeezing transformation. It is found that the system evolves by a rotated-squeezed-coherent state when the system is initially in a coherent state. Quantum dynamics of the Cooper pairs in the two superconducting islands are investigated. It is shown that the number of the Cooper pairs in the two islands evolves periodically.

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Key words: Josephson junctions, harmonic oscillators, quantum states

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