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Numerical and Experimental Analysis of Influences of 1/*f* noises on Superconducting Integrated Circuits

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Superconducting circuits such as a single flux quantum (SFQ) and a quantum flux parametron (QFP) circuits can operate with ultra-low power consumption. We have been numerically analyzing influences of the 1/*f* noise in the superconducting circuit using a conventional analog circuit simulator. To verify the numerical analysis results, we measure the gray-zone width of the QFP buffer, which corresponds to input dc current region that makes the logical decision be non-deterministic caused by the noises in the circuit. By comparing the numerically and experimentally obtained gray zone widths of the QFP buffer, the influence of the 1/*f* noise increases when the frequency of the excitation current is low. Moreover, we found that the influence of the 1/*f* noise on the QFP buffer is negligible above the 1 GHz operation.
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