

Design Study of Rapid Single Flux Quantum Digital-to-Analog Converter by Simulation

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One of the main advantages of using Single Flux Quantum logic in the Digital-to-Analog Converter is in the low operating voltage of Josephson junction digital circuits. The low operation voltage gives the excellent resolution of the output voltage of the digital-to-analog converters. In this work, we designed a Rapid Single Flux Quantum digital-to-analog converter and studied the circuit performance by simulation. The circuit was based on Nb/Al₂O₃/Nb Josephson Junction technology. Major simulation tools used include Xic and WRspice. D Flip-Flop, Splitter, T Flip-Flop, NDRO and Confluence Buffer were used in composing the Digital-to-Analog Converter. RSFQ DAC can be used not only for a simple standard of direct current but also for an alternating current standard. RSFA DAC extends a quality of voltage standard by using advanced RSFQ logic and can be applied to communication and digital electronic circuits.

keyword : RSFQ, DAC, digital, analog, converter, superconductor