Abstract Submitted
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A method of extracting operating parameters of a quantum circuit EYOB A. SETE, MAXWELL BLOCK, MICHAEL SCHEER, CRIS ZANOCI, MEHRNOOSH VAHIDPOUR, DANE THOMPSON, CHAD RIGETTI, Rigetti Quantum Computing, Berkeley, CA — Rigorous simulation-driven design methods are an essential component of traditional integrated circuit design. We adapt these techniques to the design and development of superconducting quantum integrated circuits by combining classical finite element analysis in the microwave domain with Brune circuit synthesis by Solgun [PhD thesis 2014] and BKD Hamiltonian analysis by Burkard et al. [Phys. Rev. B **69**, 064503 (2004)]. Using the Hamiltonian of the quantum circuit, constructed using the synthesized equivalent linear circuit and the nonlinear Josephson junctions' contributions, we extract operating parameters of the quantum circuit such as resonance coupling strength, dispersive shift, qubit anharmonicitiy, and decoherence rates for single-and multi-port quantum circuits. This approach has been experimentally validated and allows the closed-loop iterative simulation-driven development of quantum information processing devices.

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