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Simulation of a YBCO Superconducting Quantum Interference Filter STEPHEN M. WU, SHANE A. CYBART, JOHN CLARKE, R.C. DYNES, Physics Department, University of California, Berkeley, and Materials Sciences Division, Lawrence Berkeley National Laboratory — A Superconducting Quantum Interference Filter (SQIF) consists of a serial or parallel combination of SQUIDs of varying area that at constant current bias produces a sharp voltage peak at zero magnetic field. We simulated a serial array of 300 SQUIDs to calculate the voltage response versus applied magnetic field. We chose representative values of the junction critical current I_C and resistance R_N for ion damaged YBCO Josephson junctions. We varied the areas to maximize the sharpness and height of the voltage peak. We used the results of the simulation to design a SQIF that we fabricated and tested. The measured voltage response of the device was smaller than the predictions of the model. The agreement was significantly improved by including the effects of the geometric inductances of the SQUID loops and the Fraunhofer diffraction pattern of the individual junctions, both of which reduced the predicted amplitude of the SQIF response. It is likely that the remaining discrepancies are due partly to random variations in I_C and R_N in the experimental device, which we shall include in future simulations, and partly to the effects of thermal noise. This work was supported by AFOSR.

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