0334 - S3. SQUIDs

Microwave Dynamics and Noise of HTS Serial SQIF

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Serial type superconducting quantum interference filters (SQIF) were fabricated from metal oxide YBaCuO Josephson junctions on NdGaO3 bicrystal substrates and characterized at microwave frequencies. The SQIF structures had 20 series connected SQUIDs each with different loop areas ranging 35 ÷700 μm2. Reference structures have been fabricated on the same chip: a series array of 20 dc SQUIDs and a single dc SQUID. All SQUIDs in the reference structures had loop size 5 x 7 μm2. In the SQIF the SQUIDs had normalized inductance l≈1 for the smallest loop, and l≈4 for the largest loop. At T=4.2 K the ICRN-product was ≈1 mV for the single SQUID. ICRN =14 mV for the SQIF, and 25 mV for the series array of SQUIDs, although both had the same number of loops. Varying the applied magnetic field B for fixed bias current, I, the noise power in units of noise temperature has been measured simultaneously with the voltage-to-field, V(B), response function. Measurements were carried out in the screened environment using a cooled HEMT preamplifier with noise temperature TN=8±2 K and power gain G=21 dB in the frequency band 1-2 GHz. After further amplification a spectrum analyzer was used to measure the output noise spectrum. Magnetic field-to-voltage transfer factors were estimated for single SQUID, SQIF and serial regular SQUIDs array. Results of measurements and influence of spread in parameters on the device characteristics are discussed using an analytical model.

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