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Measurement of a SQUID metamaterial[1] DAIMENG ZHANG, MELISSA TREPANIER, STEVEN ANLAGE, University of Maryland, College Park
— We report experimental results on a new type of superconducting metamaterial consisting of arrays of RF SQUIDs operating in the microwave frequency range with tunable properties (S parameters, effective permeability, effective permittivity, etc.). DC magnetic field is applied to bias the sample and to vary the Josephson inductance, thus tuning the resonant frequency over a multi-GHz range. The experiment is done in a magnetic-shielded cryostat where we examine the temperature, RF-field, and DC-field dependence of S parameters of this superconducting metamaterial. We also perform a cryogenic calibration to eliminate the effects of transmission lines on our results. From the calibrated S-matrix of this metamaterial, we are able to extract the effective permeability and its response to various stimuli.

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