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Two Dimensional Intermodulation Distortion Scanning of Superconducting Filter Resonators MICHAEL BISCHAK, STEPHEN REMILLARD, Hope College — Nonlinear superconducting conductivity produces distortion that has usually been measured globally across the entire sample. In order to fully understand the origin of non linearity, local methods must be used to examine specific points in the sample. The nonlinear Ohm's law, V=IZ(I) includes the current dependence in the impedance. The method in this work raster scans a magnetic loop probe across a sample. In order to address limited resolution, we reduced the size of the magnetic loop probe. Using the electromagnetic field solver, sonnet, two dimensional current simulations of superconducting microwave filters composed of Tl2Ba2CaCu2O8 or of YBa2Cu3O7 reveal microwave current which is bunched up at the corners and sides of the sample. Two dimensional images of third order intermodulation distortion made with the magnetic probe at the same corners and edges reveal elevated distortion in the same places. Using the magnetic probe, third order intermodulation was seen to come from the same corners and edges where the current is bunched. This research was funded by the National Science Foundation under grant number DMR-1206149.

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