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Time-Reversal Symmetry Breaking in the Non-Linear Distortion from Superconducting Circuits[1] EVAN PEASE, Kenyon College, STEPHEN REMILLARD, Hope College — Microwave filters made from high temperature superconductors (HTS) are known to produce measurable harmonic and intermodulation distortion (IMD) at incident power levels as low as a small fraction of a microwatt. Distortion created by the filters sets a limit for use in microwave technologies, and its observation provides a better understanding of the electrodynamics of the HTS materials. Multi-tone measurements have been performed to detect the distortion, and with a three-tone technique even and odd order distortion currents are measured at the same frequency. Both even and odd order IMD are measured at the resonant frequency, permitting the experimental observation of time-reversal symmetry breaking in superconducting current. A catastrophic increase in only the odd order IMD near the transition temperature, Tc, is consistent with the expectations of the non-linear Meissner effect. The absence of such a catastrophe in the even order distortion indicates a higher order of time-reversal symmetry in the currents near Tc. The slopes of the IMD curves approach their ideal values close to Tc consistent with the linear-nonlinear interaction theory.

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