

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Origins of Nonlinearity in Superconductive Passive Circuits¹

SEAN HAMILTON, Grand Valley State University, STEPHEN REMILLARD, Hope College — The distinct origins of even and odd order nonlinear behavior in type II cuprate superconductors have yet to be fully elucidated. Microwave intermodulation distortion (IMD) was examined in a YBCO superconducting thin-film hairpin resonator at 840 MHz. Measurements of the temperature dependence of IMD near T_C support the view that the nonlinear Meissner effect is responsible for the occurrence of both 2nd and 3rd order IMD tones near T_C as well as their suppression in an applied magnetic field. However, at lower reduced temperatures (T/T_C less than 0.95), where the influence of the nonlinear Meissner effect is less pronounced, 3rd order IMD is unaffected by a static magnetic field, while 2nd order IMD decays exponentially after a static magnetic field is removed with a temperature dependent time constant. It is apparent that the magnetically induced remnant vortex state contributes to the 2nd order nonlinearity, but not to the 3rd order nonlinearity, and that this effect is diminished close to T_C due to degradation of the remnant vortex state.

¹This research was funded by the National Science Foundation under grant number DMR-1206149.

Sean Hamilton
Grand Valley State University

Date submitted: 13 Nov 2014

Electronic form version 1.4