Abstract Submitted
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Transient even and odd order nonlinearity of a YBCO transmission line[1] RICHARD HUIZEN, Grand Valley State University, STEPHEN REMILLARD, Hope College — Second (IMD2) and third (IMD3) order intermodulation distortions were found to exhibit dependencies on temperature and magnetic field. A carrier wave at the 890 MHz resonant frequency of the type-II $YBa_2Cu_3O_{7-\delta}$ superconducting resonator circuit, with T_C =89K, was introduced into the circuit via an electric coupling antenna. Two off-resonance probe signals were injected into the circuit via a separate magnetic coupling element. The combination of these three signals locally excited synchronous second and third order IMD. A static magnetic field was applied perpendicularly to the film which induced magnetic flux vortices in the sample. Upon removal of the static magnetic field, IMD2 and IMD3 exhibited distinct transient decay modes correlating to temperature. Between 85.0K and 87.5K, IMD3 decayed exponentially. Above 87.5K, IMD3 exhibited bounded exponential growth, while within a narrow temperature range around 87.5K, removal of a static magnetic field strongly suppressed IMD3. IMD2 exhibited exponential decay at all temperatures. Even and odd order microwave nonlinearities were thus shown to result from different, magnetically coupled, physical mechanisms.

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Richard Huizen
Grand Valley State University

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