# Abstracts

## Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure

*F. Gao, M.V. Klein, J. Kruse and M. Feng. "Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 944-952.*

We have carefully studied the mode coupling effect from analysis of the measured microwave scattering parameters of superconducting films using a parallel-plate-resonator technique. Due to its high resolution and simplicity, this technique has been widely employed to identify the quality of high-TC superconducting films by measuring the resonance bandwidth, from which the microwave surface resistance is directly derived. To minimize the radiation loss, the resonator is usually housed in a conductive cavity. Using this method, we observe that a number of strong "cavity" modes due to the test enclosure fall around the lowest TM mode of the superconducting resonator and that a strong interaction between these two types of resonant modes occurs when their eigenfrequencies are close, causing a significant distortion or a strong antiresonance for the resonator mode. To describe this effect, a coupled harmonic-oscillator model is proposed. We suggest that the interaction arises from a phase interference or a linear coupling among the individual oscillators. Our model fits very well the observed Fano-type asymmetric or antiresonant features, and thus can be used to extract the intrinsic Q of the superconducting resonator.

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