Abstracts

Transmission-line analysis of a capacitively coupled microstrip-ring resonator

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The resonant frequencies of a microstrip-ring resonator capacitively coupled to a feed line are accurately analyzed using a transmission-line model. By making use of ABCD- and Y-admittance matrices, a compact closed-form expression for the input impedance of the ring alone is analytically derived and shows that the ring ran be equivalently viewed as a frequency-dependent capacitor. The coupling gap is then modeled by an equivalent L-network comprising a parallel and a series gap capacitance obtained by modifying Garg and Bahl's closed-form expressions for an end-to-end microstrip gap. By simplifying the parallel and series combinations of the overall equivalent circuit, the total input impedance looking from the feed line to the gap is analytically derived to predict the resonant frequencies. To verify the analysis, the resonant frequencies of the capacitively coupled ring resonator have been accurately measured, with the experimental results showing very good agreement with the theoretical predictions.

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