Abstracts

Narrowband Lumped-Element Microstrip Filters Using Capacitively-Loaded Inductors (1995 Vol. II [MWSYM])

D. Zhang, G.-C. Liang, C.F. Shih and R.S. Withers. "Narrowband Lumped-Element Microstrip Filters Using Capacitively-Loaded Inductors (1995 Vol. II [MWSYM])." 1995 MTT-S International Microwave Symposium Digest 95.2 (1995 Vol. II [MWSYM]): 379-382.

Coupling between microstrip resonators decreases very slowly as a function of the resonator separation. Therefore it is difficult to realize narrowband filters (e.g. <0.1% bandwidth) in microstrip form due to the very weak coupling values required. In this paper, we have developed a class of lumped-element filters that uses capacitively-loaded inductors to give frequency-dependent inductance values. A novel frequency-transformation technique is used in the design process. Using this approach, strong coupling can be used in narrowband filter designs. The frequency-dependent inductance transforms the filter to a narrower bandwidth than the original circuit prototype, and does not require hard-to-realize weak coupling. We present a 0.3% bandwidth superconducting microstrip prototype filter. It was designed with the coupling of a 1% bandwidth filter, and then transformed to 0.3% fractional bandwidth using an appropriate inductance slope parameter, dL/d omega. Measurement showed good agreement with theory.

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