Abstracts

New Theory and Design for Hairpin-Line Filters

U.H. Gysel. "New Theory and Design for Hairpin-Line Filters." 1974 Transactions on Microwave Theory and Techniques 22.5 (May 1974 [T-MTT]): 523-531.

Hairpin-line and hybrid hairpin-line/half-wave parallel-coupled-line filters are preferred filters for microstrip and TEM printed-circuit realizations. This class of filters offers small size and, in general, needs no ground connections for resonators. A new design theory is presented that is based on a sparse capacitance matrix for the array of coupled lines that constitute the filter, as opposed to a sparse-inductance-matrix assumption in previous theories that is much harder to satisfy. It is shown that to a good approximation, hairpin-line filters result from frequency-scaling half-wave parallel-coupled-line filters. Because of this; the bandwidth can be accurately predicted. Design procedures are given for Type-A filters, which are useful up to 20-percent bandwidth. A variety of hybrid hairpin-line/half-wave parallel-coupled-line filters is possible, and their design is explained. Numerical results for a number of designs and experimental results for a 5-percent bandwidth filter are included.

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