Abstracts

Design of Hairpin-Line and Hybrid Hairpin-Parallel-Coupled-Line Filters

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Hairpin-line filters are compact structures particularly suited for microstrip and TEM printed circuit realizations. Two types of hairpin-line filters are described in this paper. They are shown in Figs. 1(a) and (b). The image impedance and propagation constant for the infinite periodic hairpin-line has been given previously. Equivalent circuits for several periodically-terminated lines, including the hairpin line were discussed by one of the authors at the recently-concluded IEEE sixth region conference. However, for finite length hairpin-line filters, neither exact or approximate design equations, nor equivalent circuits have been reported. The exact equivalent circuits for the filters of Figs. 1(a) and (b) have been rigorously derived and are presented in Figs. 2(a) and (b), respectively, for the most important case in which coupling beyond nearest neighbors is negligible. These circuits are topological, but not exact, duals of the well-known interdigital and half-wave parallel-coupled-line filters. Consequently, the exact design tables and approximate design equations may be used in designing hairpin-line filters.

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