Abstracts

Synthesis of Symmetrical TEM-Mode Directional Couplers

P.P. Toulios and A.C. Todd. "Synthesis of Symmetrical TEM-Mode Directional Couplers." 1965 Transactions on Microwave Theory and Techniques 13.5 (Sep. 1965 [T-MTT]): 536-544.

Exact synthesis procedures are derived for symmetrical three-section and five-section TEM-mode directional couplers. These synthesis procedures are based on the equivalence between the theory of directional couplers and stepped quarter-wavelength filters as previously described by Levy and Young. Explicit formulas for the parameters of three-section couplers are presented. A realizable insertion-loss function is derived for the five-section coupler resulting in an equal-ripple response. Although this function has an equal-ripple characteristic, it is not expressible in terms of Chebyshev polynomials. Results obtained for the five-section coupler show considerable improvement in bandwidth over a three-section coupler. For example, a five-section coupler of -3 ±0.5 dB has a bandwidth of 9.6:1 as compared with 5.8:1 for a three-section coupler of -3 ±0.5 dB. A five-section coupler of -10 ±0.5 dB was designed on this theoretical basis for the 555-4000 Mc band, and the measured shows good agreement with the theoretical coupling sponse, yielding a minimum directivity of 18.0 dB at 3.7 Gc.

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