Abstracts

Nonuniform Transmission Line Codirectional Couplers for Hybrid Mimic and Superconductive Applications

S. Uysal, C.W. Turner and J. Watkins. "Nonuniform Transmission Line Codirectional Couplers for Hybrid Mimic and Superconductive Applications." 1994 Transactions on Microwave Theory and Techniques 42.3 (Mar. 1994 [T-MTT]): 407-414.

A new design approach for thin-film codirectional quadrature couplers and their applications is described. An in-depth analysis and semi-empirical design curves are presented for these couplers. Forward-wave coupling is achieved by making use of the difference between even- and odd-mode phase velocities. Modified nonuniform codirectional couplers with a dummy channel for continuously decreasing or increasing taper and employing wiggly, serpentine and smooth coupled edges have been designed and tested. It is found that a wiggly coupler can achieve a 50% length reduction compared to a smooth-edge coupler. A further 60% length reduction compared to a wiggly coupler is achieved by a serpentine coupler. Coupler performance for wiggly and serpentine configurations is computed by choosing a realizable phase velocity function for a given coupler length. Either constant 90° or -90° phase shift is possible with these couplers giving significant design flexibility in some applications. The results for a K/sub u/-band Sigma - Delta Magic-T circuit employing a 0 dB wiggly coupler and a -3 dB smooth-edge coupler are also presented in the paper.

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