Abstracts

Synthesis Techniques for High Performance Octave Bandwidth 180° Analog Phase Shifters

S. Lucyszyn and I.D. Robertson. "Synthesis Techniques for High Performance Octave Bandwidth 180° Analog Phase Shifters." 1992 Transactions on Microwave Theory and Techniques 40.4 (Apr. 1992 [T-MTT]): 731-740.

Novel techniques for synthesizing 180° analog reflection type phase shifters, with ultra-low phase and amplitude error characteristics, over a very wide bandwidth, are presented. The novel approach of cascading stages, where the nonlinear performance of each stage compliments those of the others, results in a significant advance in the linearity performance of traditional reflection-type phase shifters. In this paper, it is shown by theoretical analysis that three conditions must be satisfied by the reflection terminations, in order to achieve the desired response. The theoretical conditions and subsequent design equations are given; Simulation results for a 2-stage Ku-band cascaded-match reflection-type phase shifter show that a very low maximum phase error and amplitude error of ± 2.4° and ±0.2 1 dB, respectively, can be achieved over a full octave bandwidth, Since the complexity of the overall topology is reduced to a minimum, the device appears insensitive to process variations and ideal for both hybrid and MMIC technologies.

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