Abstracts

Design and Computed Theoretical Performance of Three Classes of Equal-Ripple Nonuniform Line Couplers

The purpose of this paper is to provide an accurate theoretical picture of three classes of tapered-line couplers. The coupler taper is approximated with a cascade of short equal-length coupled line segments whose coupling values match those of the taper at one end of each segment. Exact analysis of the even-mode transmission-line analogy is then performed by evaluating the ABCD matrix of the cascade as a function of frequency with the aid of a digital computer. The computed response converges to that of the smooth tapered coupler as the number of line segments increases, total length being held constant. An exact asymptotic high-frequency model for asymmetric couplers is presented which provides improved prediction of coupler performance, as verified by computer analysis. The associated design procedures are given explicitly. The insertion phase dispersion of the 90° and /spl Sigma/ - /spl Delta/ magic tee devices is treated. Comparisons with the insertion phase dispersion of various stepped coupling 90° designs are provided.

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