Abstracts

Hyperbolic Secant Coupling in Overmoded Waveguide

J.L. Doane. "Hyperbolic Secant Coupling in Overmoded Waveguide." 1984 Transactions on Microwave Theory and Techniques 32.10 (Oct. 1984 [T-MTT]): 1362-1371.

This work presents a new solution of the coupled-mode equations for a hyperbolic secant spatial variation of the coupling between two modes. An analytic expression is given for the transmission coefficient for arbitrary complex differential propagation constant and coupling strength. The expression is particular simple in the case when the differential attenuation between the modes is negligible. Design curves are presented in terms of normalized parameters. The hyperbolic secant coupling may be truncated and still yield virtually the same transmission as for infinite couping length. The required coupling length is indicated by a comparison of the ideal expression with the results of numerical integration of the coupled-mode equations. Hyperbolic secant coupling can be particularly useful for the design of short low-loss broad-band bends, twists, and mode-selective couplers in overmoded waveguide. Results of tests on 90-degree bends in rectangular and corrugated circular waveguide are consistent with the theory.

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