Abstracts

Analysis and Measurements of Nonradiative Dielectric Waveguide Bends (Aug.1986 [T-MTT])

T. Yoneyama, H. Tamaki and S. Nishida. "Analysis and Measurements of Nonradiative Dielectric Waveguide Bends (Aug.1986 [T-MTT])." 1986 Transactions on Microwave Theory and Techniques 34.8 (Aug. 1986 [T-MTT]): 876-882.

The coupling theory is applied to analyze loss characteristics of the NRD-guide bends. Besides the operating LSM/sub 01/ mode, the parasitic LSE/sub 01/ mode is generated at bends as a result of the mode conversion. A rigorous expression for the coupling coefficient between these two modes is derived and then employed in the two-mode coupling equations to be solved for the bending loss analysis. Design diagrams, which are useful for optimizing the strip width against a given curvature radius to build a lossless bend, are constructed for 90 and 180° NRD-guide bends. It is shown that the field profile at a bend always shifts inwards. This confirms the previous experimental prediction. It is found that the periodic spikes on the loss versus frequency curve of a bend, which have been observed before, can be interpreted as being caused by resonances of the parasitic mode between the transition horns fixed at both ends of the bend, and that the true bending loss itself is normally restricted within a reasonable level. As an application of the present theory, a lossless 180° bend with a curvature radius of 5 mm was fabricated with polystyrene and tested at 50 GHz. The measured bending loss was less than 0.3 dB.

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