Abstracts

Characteristics of Dielectrically Loaded Ladder Lines for Traveling-Wave Masers and Other Applications

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The characteristics of ladder lines are investigated in detail and the effects of the various dimensions of the ladder line and the enclosing structure on the omega-Beta characteristic are presented. The effects of a dielectric material placed at different positions in the structure on the characteristics are also examined in detail. Dielectric materials selected for investigation have relative dielectric constants of 9, 100, and 256, characteristic of ruby and rutile, which have been shown to be good maser materials. It is shown that a nonpropagating easitron circuit may be made to propagate by loading it with a dielectric material, in which case the ridge in a Karp-type slow-wave structure may be eliminated. This results in a simple traveling-wave maser structure. The input impedance to the ladder-line structure and the structure ohmic loss have been evaluated and are presented in the figures. This information is useful in designing transducers to couple the power into and out of the structure, and gives an estimate of the expected ohmic loss in the structure.

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