Abstracts

Compact Quasi-Periodic and Aperiodic TE/sub 0n/ Mode Converters in Overmoded Circular Waveguides for Use with Gyrotrons

M.J. Buckley and R.J. Vernon. "Compact Quasi-Periodic and Aperiodic TE/sub 0n/ Mode Converters in Overmoded Circular Waveguides for Use with Gyrotrons." 1990 Transactions on Microwave Theory and Techniques 38.6 (Jun. 1990 [T-MTT]): 712-721.

Designs of compact quasi-periodic and aperiodic TE/sub 0n/-TE/sub 0n-1/ circular waveguide converters for use with gyrotrons in an electron cyclotron heating (ECH) system are developed by analytically and numerically solving the coupled-mode differential equations. Quasi-periodic mode transducer designs are developed which convert the TE/sub 02/ mode to the TE/sub 01/ mode and in some cases include a taper (waveguide radius reduction). A 60 GHz aperiodic mode converter-taper combines a 6.35 cm-2.779 cm waveguide diameter taper and a TE/sub 02/ -TE/sub 01/ mode converter. A 140 GHz aperiodic mode converter-taper combines a 6.35 cm-2.779 cm waveguide diameter taper and a TE/sub 03/ -TE/sub 02/ -TE/sub 01/ mode converter. The resulting designs are highly efficient (conversion efficiencies >= 99.4%), are shorter, have a broader bandwidth than previous designs, and have a waveguide radius greater than or equal to 1.389 cm over the entire length of the transducer to allow for high-power transmission. Experimental results which are consistent with theoretical calculations are presented.

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