Abstracts

Experimental coupling efficiency of shaping mirrors matching a 168-GHz gyrotron output wave to the HE/sub 11/ mode

Y. Hirata, M. Komuro, Y. Mitsunaka, K. Hayashi, S. Sasaki, Y. Kanai, S. Kubo, T. Shimozuma, M. Sato, Y. Takita, K. Ohkubo and T. Watari. "Experimental coupling efficiency of shaping mirrors matching a 168-GHz gyrotron output wave to the HE/sub 11/ mode." 1999 Transactions on Microwave Theory and Techniques 47.8 (Aug. 1999 [T-MTT] (Mini-Special Issue on Low-Power/Low-Noise Technologies for Mobile Wireless Communications)): 1522-1527.

This paper presents an experiment in which the phase- and amplitude-flattened output of a 168 GHz gyrotron was converted into the HE/sub 11/ mode, the basic transmitting mode in corrugated waveguides, by means of an external matching box (MBOX) comprising two curved-surface mirrors. In estimating the coupling efficiency between the gyrotron output wave and the HE/sub 11/ mode, an improved method was proposed in which the reconstructed phase of the gyrotron output wave at four distances are averaged. From the phase reconstruction with averaging, it was found that 76% of the gyrotron output coupled into the HE/sub 11/ mode in a corrugated waveguide, while a coupling efficiency of 85% was calculated for an ideal gyrotron output. A detailed discussion on the MBOX performance as well as the accuracy of phase reconstruction shows that this low coupling efficiency is due to the nonideality of the actual gyrotron output and that designing the MBOX mirrors based on the actual measurement at the gyrotron window can improve the coupling efficiency.

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