

OPTIMIZATION OF MICROWAVE GENERATION BY COAXIAL VIRCATOR

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The coaxial virtual cathode oscillator (vircator) developed by Texas Tech University was studied in order to improve the efficiency of microwave generation. The microwave frequency and mode were diagnosed. The results were used to design a microwave reflector that enhances the microwave fields in the vircator area. The experimental results with the microwave reflector have shown that both the microwave output power and the direction of microwave field polarization strongly depend on the configuration of the microwave reflector. These results indicate that the microwave reflector could be used as a control of the beam-field interaction in the vircator. The objective of this experiment is to improve the vircator performance by means of this control. With electron beam parameters of 400 kV, 40 kA, and 30 ns, the typical output is TE₁₁ mode microwaves at 2 GHz with the peak power of 800 MW. The microwave efficiency is 5% which was approximately twice as large as that obtained without the microwave reflector. These experimental results were compared with numerical simulation results to understand the effect of field enhancement by the microwave reflector.

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