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High-Power Microwave Generation by a Double-Anode Virtual Cathode Oscillator

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The virtual cathode oscillator (vircator) is one of the promising devices oscillating high-power microwaves. Simplicity and high-power capability are advantages. However, the low efficiency and frequency stability are serious problems. To improve oscillation efficiency, strengthen the feedback of the electromagnetic wave to the electron beam is important. To strengthen feedback, double-anode is effective because it strengthens the modulation of beams. In this paper, we dealt double-anode to improve output power. Experiments were carried out on a repetitive pulsed power generator "ETIGO-IV"(maximum output: 400 kV, 13 kA, 120 ns, 1 Hz). The output microwaves are diagnosed for peak power and energy by using horn antennas. The microwave frequency is obtained by fast-Fourier analysis of the signal recorded by a high-speed digital oscilloscope. From the experimental result, the microwaves are obtained peak power of ˜100MW. These results are shown that the output of the virtual cathode oscillator can be progress by using the double-anode. In addition, particle-in-cell simulations were carried out by using a simulation code "MAGIC."Simulation results are compared with experimental results to examine the effect of the double-anode and possible ways of further improvement of microwave efficiency.

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