
Enhancing the power of High Power Microwaves and Investigations for the position of virtual cathode oscillator inside the drift tube by using Zone Plate.

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Having the merits of device simplicity, high output-power capacity, the virtual cathode oscillator (vircator) proved their capability for emitting high power microwaves. We investigate the axial type vircator in our pulsed power generator "chundoong" (Max 600 kV, 88 kA, and 60 ns) and simulate by using 3-D particle-in-cell simulation code called "MAGIC". We try to find out the position of the vircator inside the drift tube and also to enhance the power of microwaves by focusing them at one focus point using ring type zone-plate with the focal length of 18.8 cm. The dominant frequency is obtained to be 3.5 GHz measured by FFT, which is in good agreement with simulation frequency. It is found that the mean position of vircator is almost same as A-K gap distance 10 mm, in which it oscillates from 7.9 mm to 12.1 mm behind the meshed anode which is verified by simulation results. The maximum output power obtained to be 0.66 GW (without zone plate) with the power collecting efficiency of 27% which is maximized up to 1.22 GW with the efficiency of 51% at focus point by using zone plate. The microwave emission mode from the vircator is TM_{01} mode based on simulation results. Zone plate contributes significantly to enhance the power collecting efficiency as well as helps to find out the position of vircator. These observations might be helpful to develop an efficient microwave source by using zone plate after knowing the position of vircator.