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Characteristics of Diode Perveance and output microwave Power in Coaxial Virtual Cathode Oscillator

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When an electron beam is generated from a cathode, an electron sheath plasma is also generated so that perveance of the diode is varied and changes the diode output characteristics. In our pulse power system "Chundoong" (Max 600kV, 88kA, 60ns), the perveance value have been experimentally investigated and estimated from diode voltage and diode current. In this experiment, the anode-cathode (A-K) gap distance has been varied from 4mm to 10mm. It is noted in this experiment that the diode perveance characteristics could be described as $P=7.0 \times 10^{-9}/d^{1.82}$. The sheath plasma expansion speed has also been estimated from the experiment, which is to be about 7cm/us under A-K gap distance 4mm. And we have also investigated an influence of anode-cathode (A-K) gap distance on output characteristics of high power microwave from coaxial virtual cathode oscillator (vircator). In this experiment, we observed that the microwave power has been dependent upon the A-K gap distance, where A-K gap has been varied from 4mm to 10mm. The maximum microwave power is observed to be 244 MW, whose efficiency is about 2.75 %, at the A-K gap distance of 4mm. Also the microwave frequencies are measured to be $5.1 \leq f \leq 5.9$ GHz from combination of coupled line band pass filter with 1 GHz band gap and dispersive delay line. It is noted that and this measured frequency is in good agreement with that of simulation. It is also found that the dominant mode of output microwave is a TM_{01}