Electrical Generator Based on Cathode Ray Tubes

Xiaodong Liu*, Qichang Liang, Yu Liang

*liuxiaod@gmail.com

Abstract

An electrical generator was designed based on cathode ray tubes. The anode moves electrons from the cathode to the receiver, which is connected to the load. The consumed power by the load is converted to output power. A second cathode ray tube shoots the electrons back to form a closed circuit.

Description

The principle of an electrical generator is to push electrons to the negative electrode. When the coils cut the magnetic lines, the Lorentz force push electrons to negative electrode. It is anticipated that electron beam is another way to deliver electrons to negative electrode. We studied the electron beam inside cathode ray tube. However, we found that the electrons cannot be delivered to the electrode if the electrode is connected to the cathode. If we cut the connection from the electrode to the cathode, the electrons cannot go back to the cathode as required by a closed circuit. To solve this problem, a second cathode ray tube is used to shoot the electrons back. Figure 1 shows the schematic of the electrical generator.

The power supplies of both cathode ray tubes are isolated DC power supply. They are also isolated from each other. The anode plate and the cathode plate form a parallel plate capacitor. The anode is outside the tube so that the electrons cannot reach the anode. The electrons reaching the receiver will go through the load. The consumed power by the load is converted to output power by DC-DC converter or DC-AC converter.

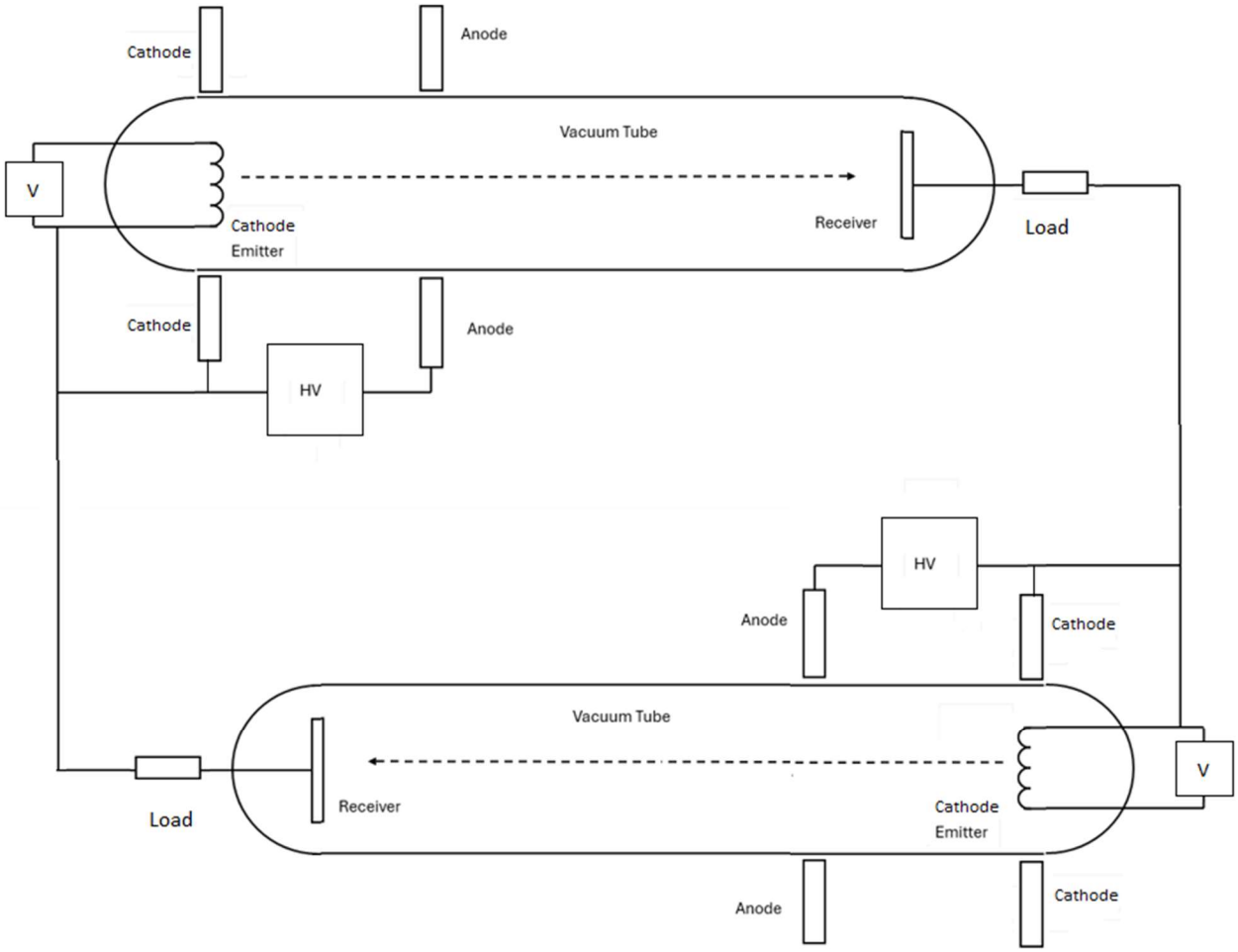

Figure 1: Schematic of the electrical generator based on cathode ray tubes.

The input power includes the power consumed by the emitter and the power consumed by the anode. The electron binding energy of metals is usually around 4.0 eV. Since the thermal efficiency is about 20%, it costs about 20 eV to emit one electron. The anode dissipates power only when the electrons hit the anode. Since the electrons cannot hit the anode, the power dissipated by the anode is zero.

The output power depends on the voltage between anode and cathode. If the voltage is 10,000 volts, each electron gains 10,000 eV energy when it just passes the anode. The electron will lose its kinetic energy when it flies away from the anode since the anode keeps pulling it back. The electron still remains 5,000 eV kinetic energy when it reaches the receiver far away. In general, most of the remaining kinetic energy can be converted to output power. Based on the above analyses, the output power is much larger than the input power.