Review Paper on Generation of High Voltage DC using Diodes & Capacitors in Ladder Network

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Abstract - The goal of this project is to generate a high DC voltage of approximately 2KV from a 230V AC power source using capacitors and diodes in a ladder network based on the voltage multiplier concept. The method of increasing the voltage is usually done with a phase transformer. The second output of the phase transformer increases the voltage and decreases the current. Another method of increasing the voltage is to double the voltage but from AC to DC. Voltage multipliers are mainly used to produce high voltage when low current is required. This project describes the concept of developing high-voltage direct current (up to 10 kV and more) from single-phase alternating current. For safety reasons, our design limits the multiplier to 8 to keep the output voltage within 2KV. This concept is used in electronics such as cathode ray tubes, cathode ray tubes, oscilloscopes and industrial applications. The circuit design includes a voltage multiplier, the purpose of which is to double the voltage for each stage. Therefore, the 8-phase voltage multiplier can be increased up to 2 kV. Since this cannot be measured with a standard multimeter, a 10:1 divider is used on the output, so that a 200 V reading is 2 kV. Due to the low voltage of the multimeter, the reading is about 7 times the AC input voltage. In addition, the design can be improved to generate a higher DC voltage in the range of 30-50 kV with the number of stages. Then it can be used for industrial and medical purposes.

Key Words*: *Voltage Multiplier, Types of Multiplier Circuits,Diode,Capacitor

1.INTRODUCTION

The world's first commercially used HVDC link was built in 1954 between mainland Sweden and the island of Gotland. As the HVDC power transmission system is constantly evolving. India's first HVDC line in Rehand-Delhi in 2010 In 1991 ie 1500 KV, 800 Mkl, 1000 km. In Maharashtra between Chandrapur and Padage at 1500 kV and 1000 MV. Global HVDC transmission capacity has grown from 20 MW in 1954 to 17.9 GW in 1984. Now DC transmission capacity growth has averaged 2500 MW per year. 230V AC based on the voltage multiplier concept using capacitors and diodes in a ladder network.. The method to increase the voltage is usually done with a step-up transformer. The secondary output of a step-up transformer increases voltage and decreases current. Another method of increasing voltage is voltage multiplication, but from AC to DC. Voltage multipliers are mainly used to develop high voltage when only low current is required. This project describes the concept of developing high voltage DC (up to 10 kV output and beyond) from single phase AC. For safety reasons, our project limits the multiplier factor to 8 so that the output is within 2KV. This generator concept is used in electronics such as CRTs, TV picture tubes, oscilloscopes and also in industrial applications. This generator concept is used in electronics such as CRTs, TV picture tubes, oscilloscopes, and also in industrial applications. The circuit design includes voltage multiplier, the principle of which is to double the voltage for each stage. Therefore, the output from an 8-phase voltage multiplier can generate up to 2 kV. Since it is not possible to measure this with a standard multimeter, a 10:1 potential divider is used on the output, a 200V reading means 2KV. Due to the low input impedance of the multimeter, the reading will be about 6 to 7 times the input AC voltage. By increasing the number further, the project can be scaled up to generate high voltage DC up to 30-50 kV. Levels. Then it can be used for medical and industrial purposes

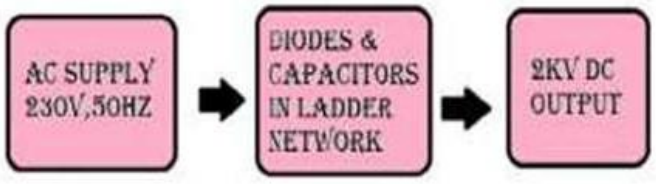

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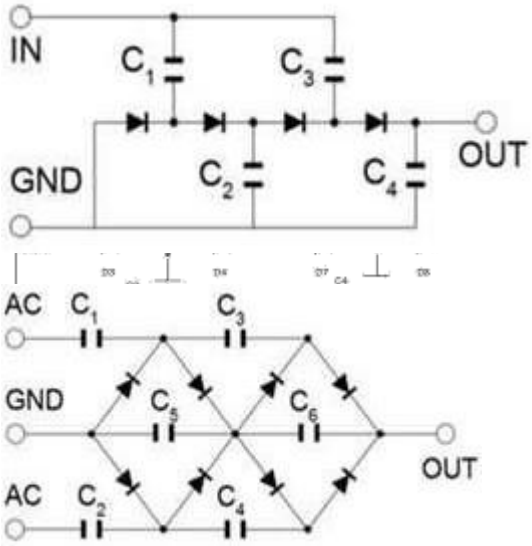
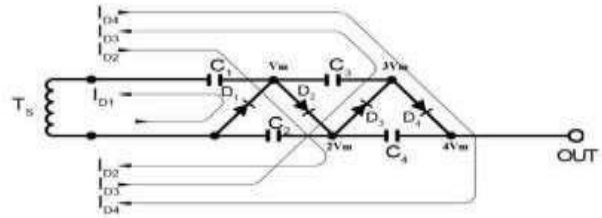
Fig . Block Diagram of Voltage Multiplier



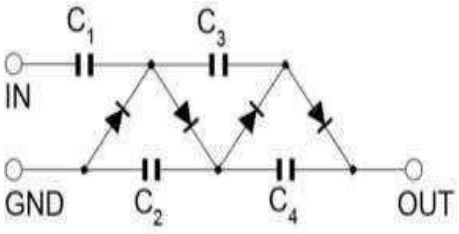
2. HOW DOES A MULTIPLIER WORKS??

- When TS is Negative Peak - C1 charges through D1 to Vm
- When TS is Positive Peak - Vm of TS adds arithmetically to existing potential C1, thus C2 charges to2Vm through D2.
- When TS is Negative Peak - C3 is charged to 2Vm through D3.
- When TS is Positive Peak - C4 is charged to 2Vm through D4.



Types of Multiplier Circuits

- Half wave series.
- Half wave parallel.
- Full wave parallel.
- Full wave series parallel.



- Half wave series.

II. Half Wave Parallel:

- Full wave parallel.

Full Wave Series Parallel

3. CONCLUSIONS

The simulation results are carried out with MATLAB/SIMULINK software and are found to be matching with theoretical calculations.Voltage Multipliers can deliver large voltages without changing the input transformer voltage. These systems are less bulky than conventional transformer rectifier sets. Different voltages can be taken at different stages without changing the input voltage. This kind of system is reliable, less complicated and light in weight..

ACKNOWLEDGEMENT

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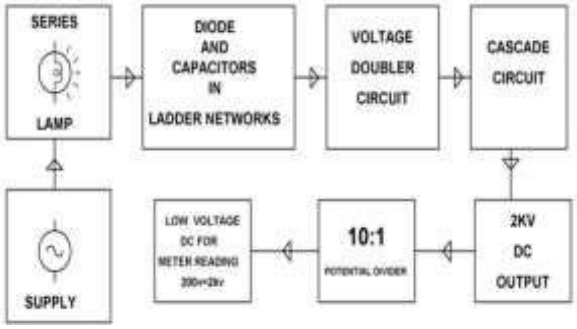

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