Voltage Quadrupler

Circuit Simulation done by:

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Theory:

In a Voltage Quadrupler circuit the output voltage is 4 times greater than that of the input voltage. This voltage quadrupling effect is achieved through the use of capacitors. We use individuals' capacitors to charge up to the input voltage. The first capacitor charges up to the input voltage of the circuit. The second capacitor has a successive effect. It charges up to the value of the input voltage but always sees the voltage from the first capacitor, having an additive effect. The result is double the input voltage. The third capacitor, again, charges up to the input voltage but sees the voltage from the other 2 capacitors, so the output is triple the input voltage. The fourth capacitor charges up to the input voltage, while seeing the voltage from the other 3 capacitors, so the output is now quadruple the input voltage. We use diodes to block capacitors from discharging once they are charged. So, it's a series of capacitors and diodes that allows this multiplying effect.

The circuit intakes an input voltage and multiplies it by 4 to give an output voltage that is 4 times larger than the input voltage. Thus, this circuit is a type of voltage multiplier circuit

Circuit Diagram:

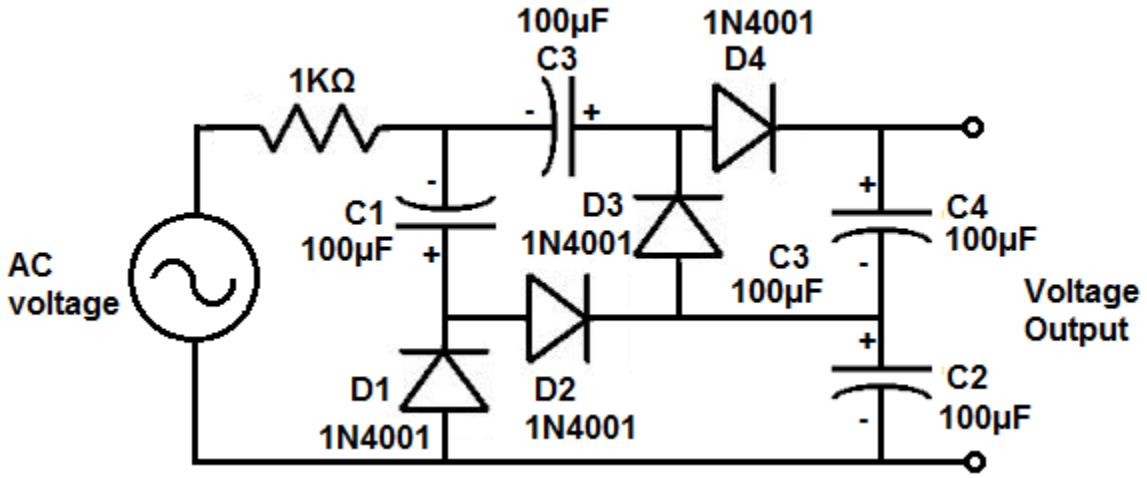

Fig 1: Circuit diagram of voltage quadrupler.

Schematic Diagram:

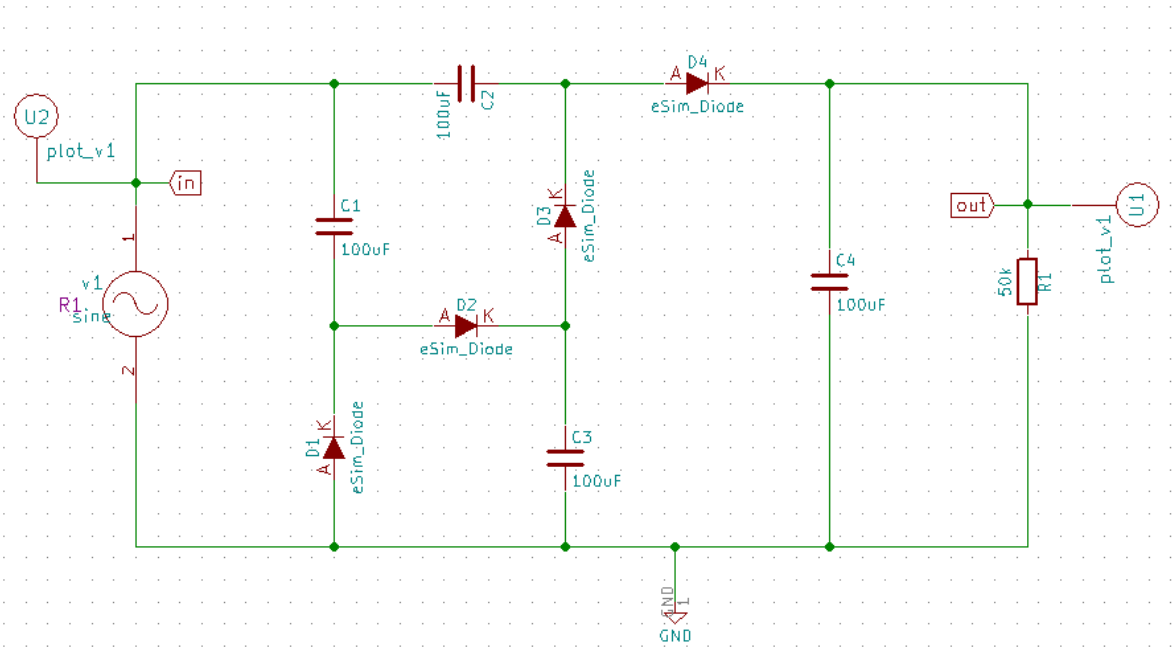

Fig 2: Schematic Diagram of a Voltage Quadrupler

Note:

R1 = 50k

Voltage = 15 V 50 Hz

C1 = C2 = C3 = C4 = 100uF

Simulation Results:

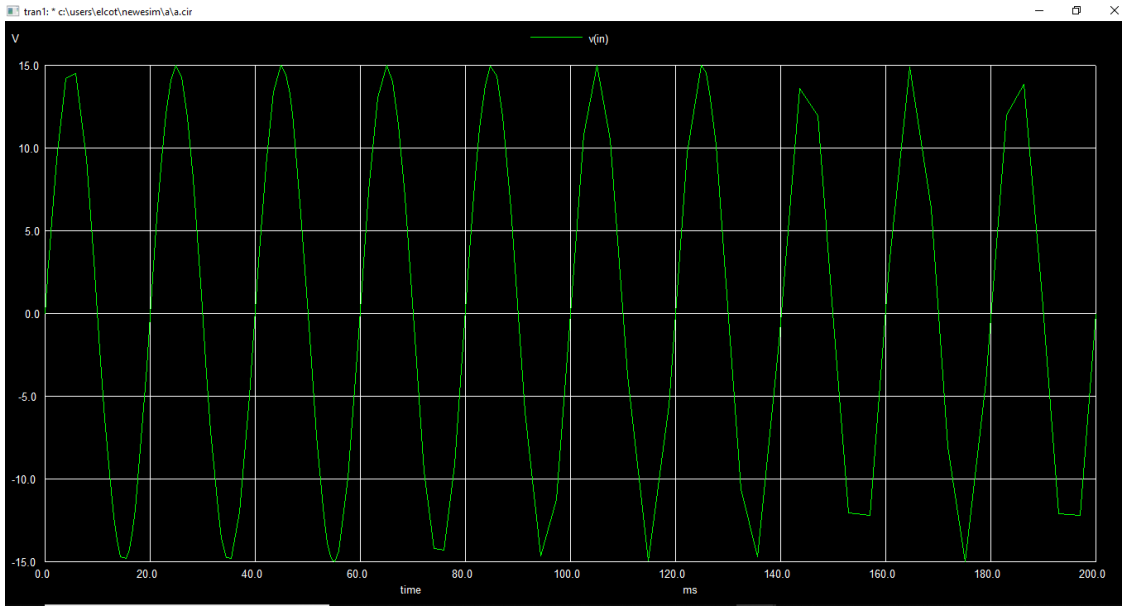

Fig 3: Ngspice plot of AC input

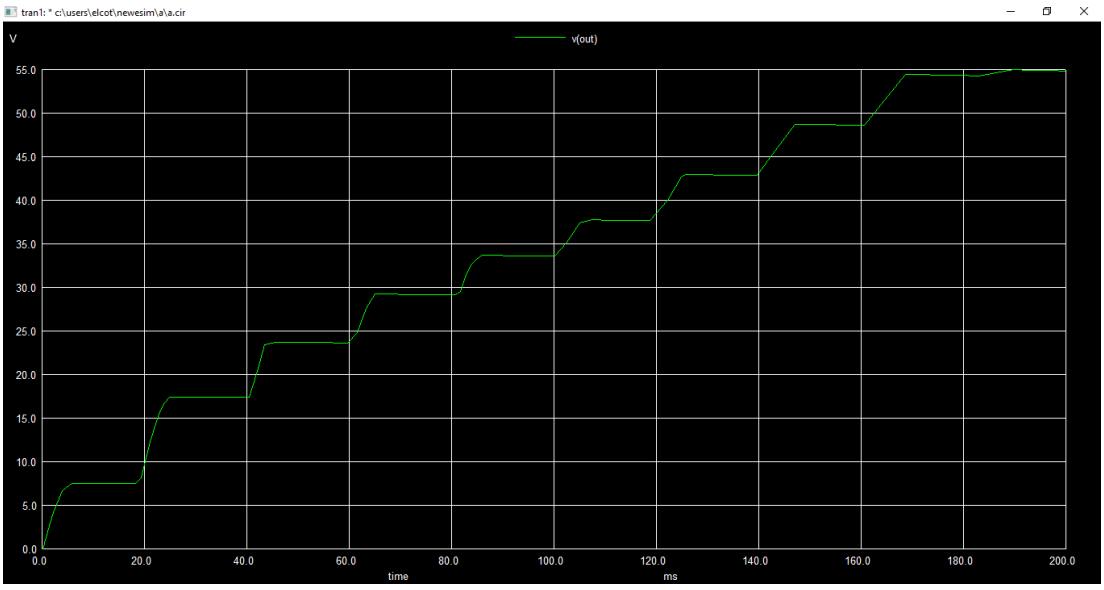

Fig 4: Ngspice plot of output Voltage.

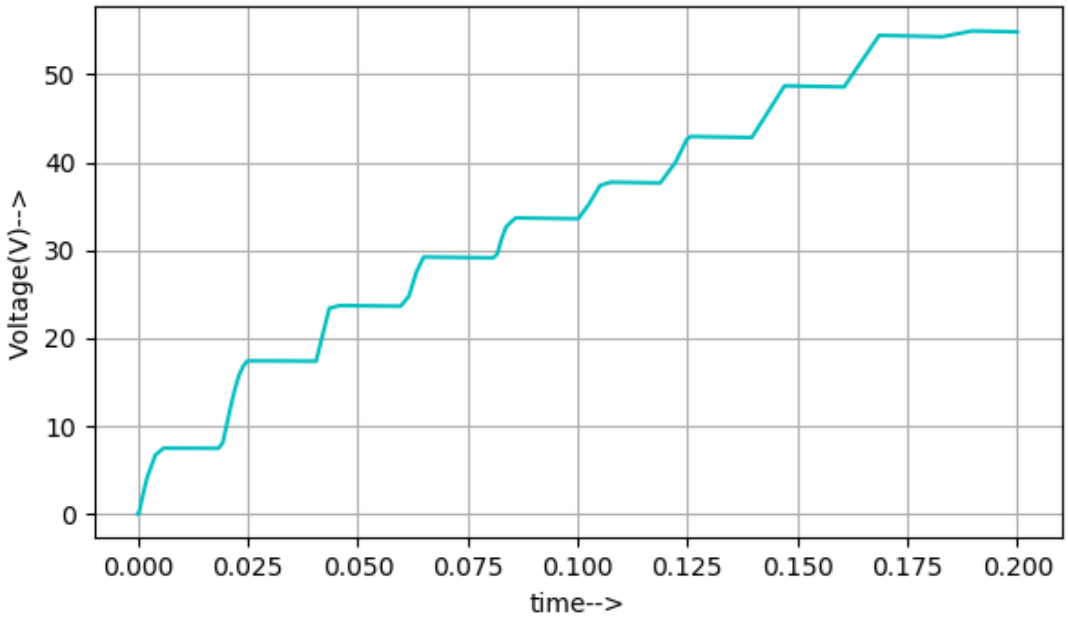

Fig 6: Python plot of output voltage.

Reference:

http://www.learningaboutelectronics.com/Articles/Voltage-quadrupler-circuit.php