KARTHAUS-FISCHER CASCADE VOLTAGE DOUBLER (KFCVD) CIRCUIT

Circuit Simulation done by:

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Theory:

   The parallel connection and stages for KFCVD circuit are presented in Fig.1. It has a component which is similar to voltage double circuit. The difference is the stages of the circuit connected in parallel in doubling the input. The double output will be stored in capacitor tank, C4. Due to the parallel connection of the stages, KFCVD circuit is also called as a parallel voltage multiplier. The equation that applied to the KFCVD and the relationship of DC output with the number of stages, n and applied input voltage, Vin, can be defined as

$$V_o = 2nV_{in} - \Delta(n) \tag{2}$$

where $\Delta(n)$ is, the voltage drop as a function of the number of stages and can be expanded as

$$\Delta(n) = \delta V_c(n) + \delta V_D + \delta_o(n) \tag{3}$$

where δV_c is the voltage drop across the coupling capacitors and δV_D is the voltage drop on diodes. The amount of voltage drop depends on the number of stages. Therefore, it can be predicted that adding on two stages will take effect on the output voltage four times of the Vin. However, during simulation processes, some undesirable errors can appear in final results. The undesirable error is defined as δ_o.

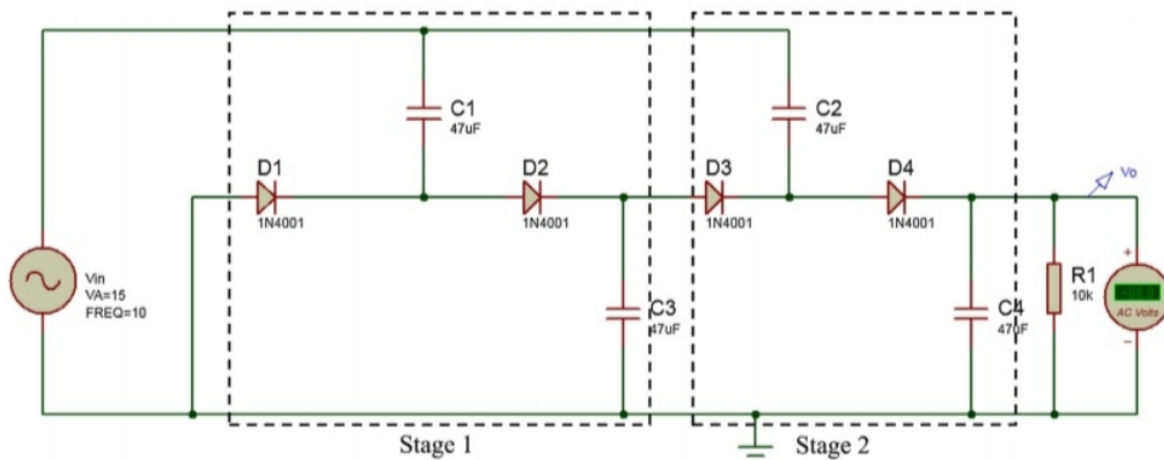Circuit Diagram:

Fig 1: KFCVD Circuit
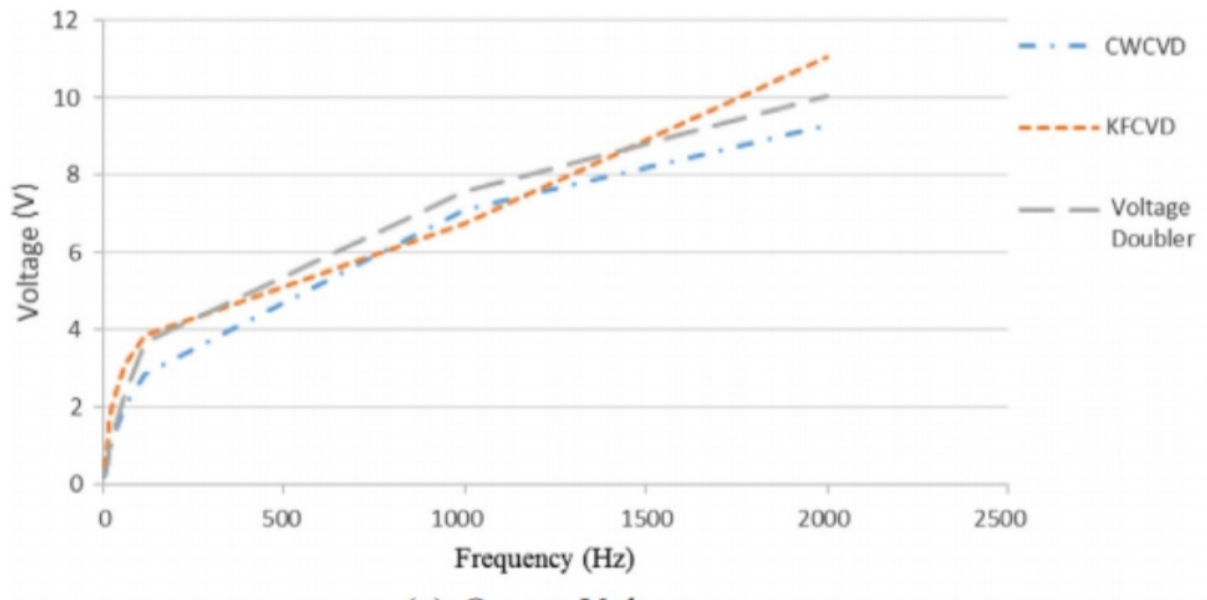
Model Graph:

Fig 2: Output Waveform of KFCVD circuit
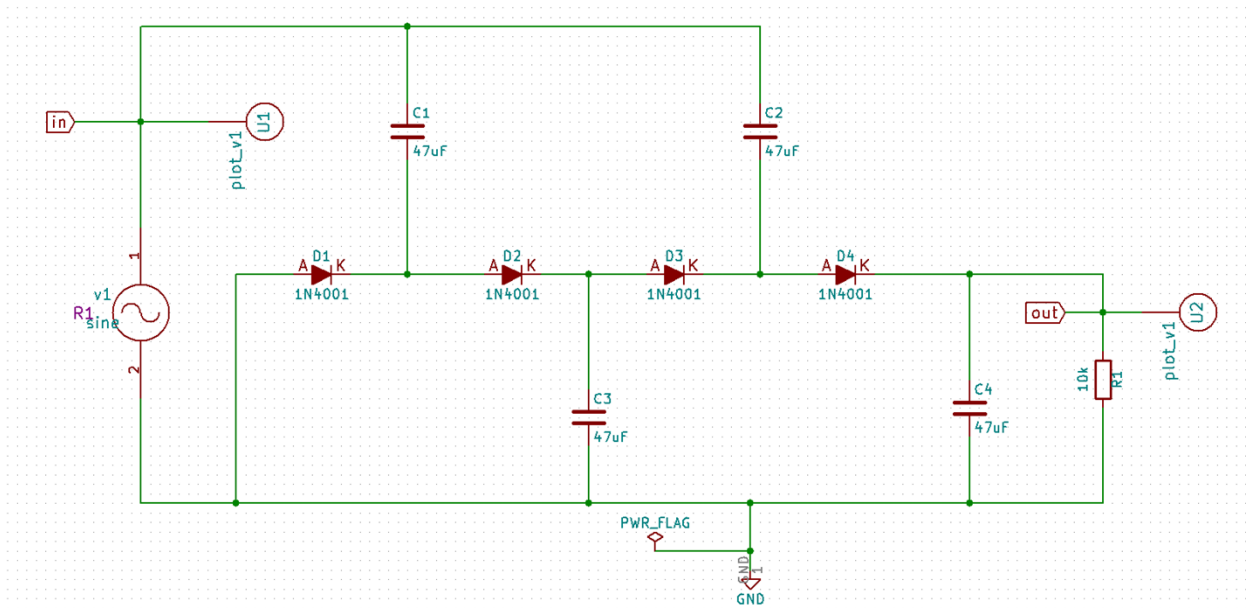
Schematic Diagram:

Fig 3: Schematic diagram of KFCVD circuit
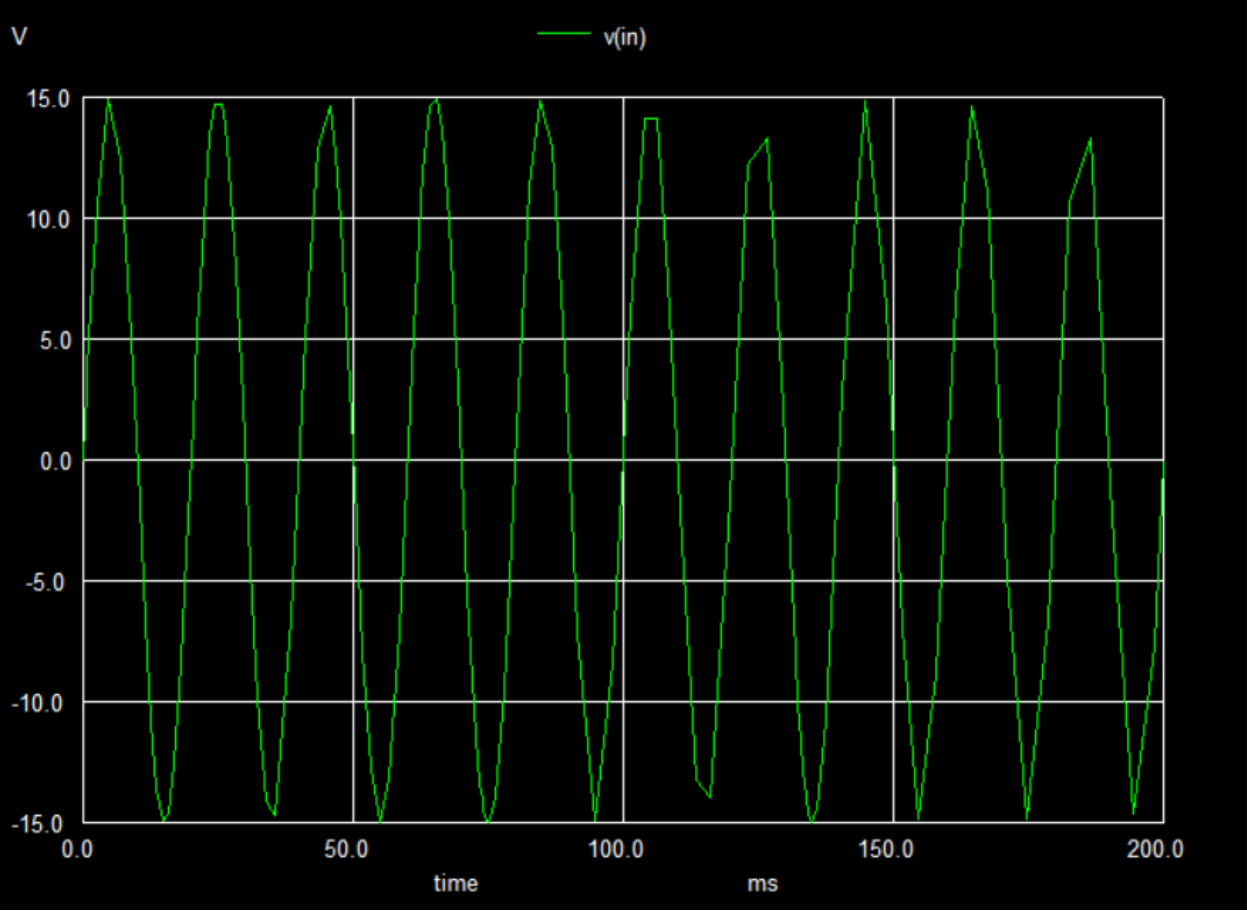
Simulation Result:
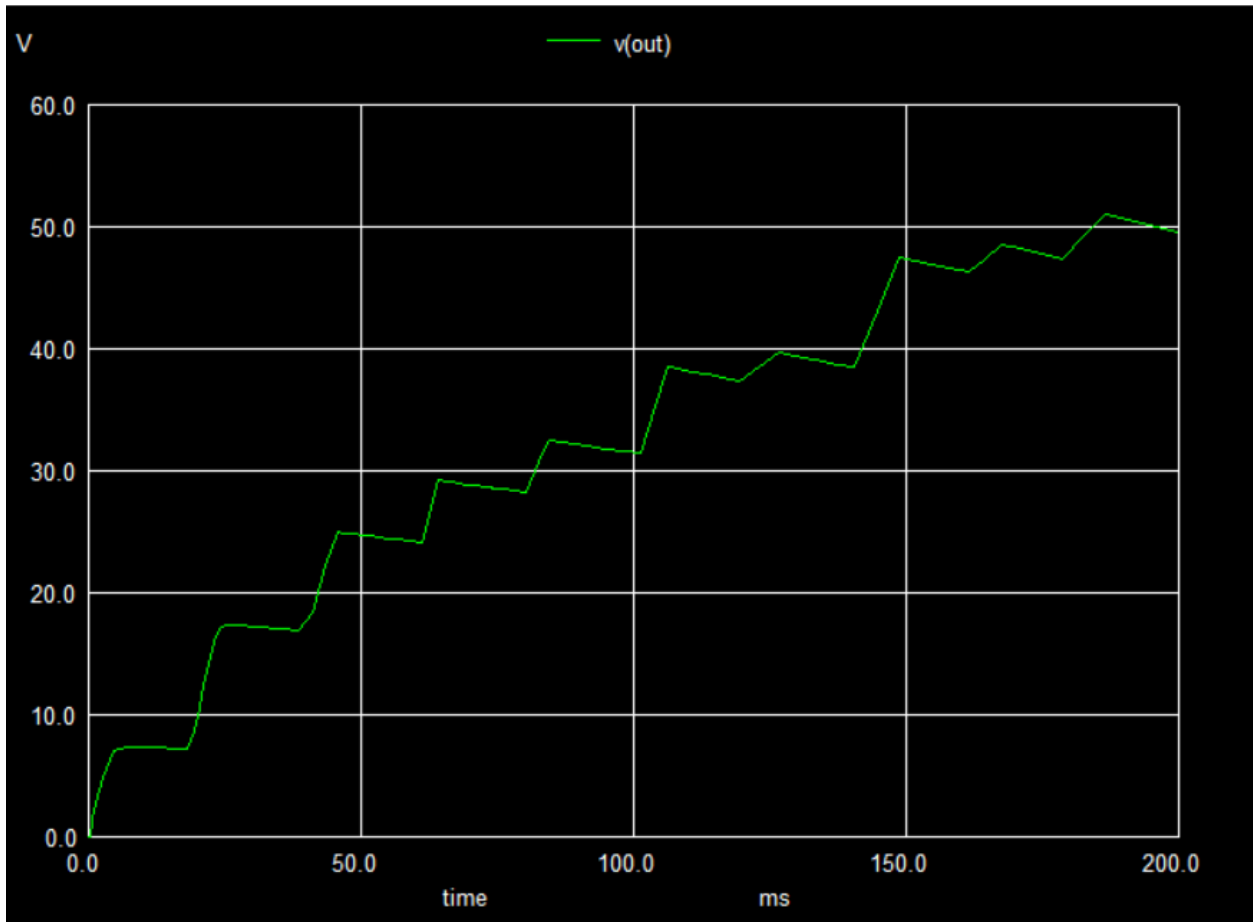

Fig 4: Input Waveform of KFCVD circuit

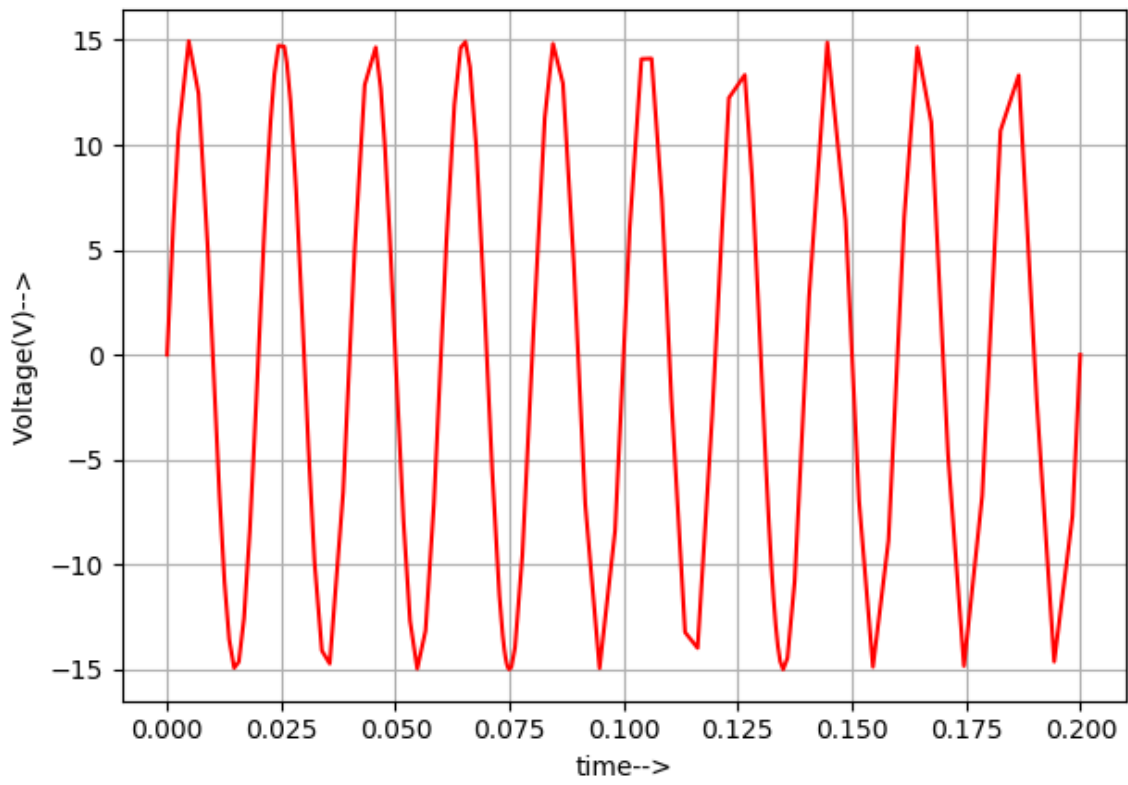Fig 5: Output Waveform of KFCVD circuit

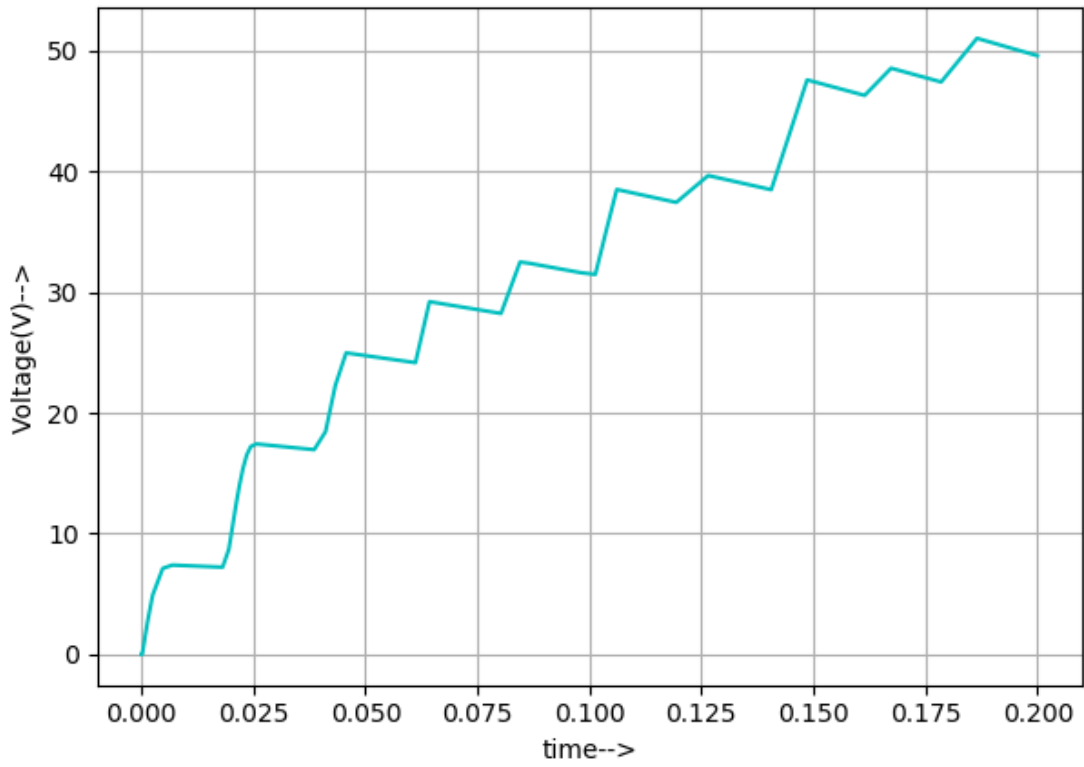Fig 6: Python plot for input waveform

Fig 7: Python plot for output waveform

Reference:

https://www.researchgate.net/Karthaus-Fischer-cascade-voltage-doubler-circuit-5_fig1_274947763