FULL WAVE RECTIFIER WITH CAPACITANCE FILTER

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DESCRIPTION

The main function of full wave rectifier is to convert an AC into DC. As the name implies, this rectifier rectifies both the half cycles of the i/p AC signal, but the DC signal acquired at the o/p still have some waves. To decrease these waves at the o/p capacitor filter is used.

In the full wave rectifier circuit using a capacitor filter, the capacitor C is located across the RL load resistor. Once the i/p AC voltage is applied throughout the positive half cycle, then the D1 diode gets forward biased and permits flow of current while the D2 diode gets reverse biased & blocks the flow of current.

Throughout the above half cycle, the current in the D1 diode gets the filter and energizes the capacitor. But, the capacitor charging will occur just when the voltage which is applied is superior to the capacitor voltage. Firstly, the capacitor will not charge, as no voltage will stay among the capacitor plates. So, when the voltage is switched on, then the capacitor will get charged immediately.

Throughout this transmission time, the capacitor gets charged to the highest value of the i/p voltage supply. The capacitor includes a highest charge at the quarter waveform in the positive half cycle. At this end, the voltage supply is equivalent to the voltage of the capacitor. Once the AC voltage begins falling & turns into less than the voltage of the capacitor, after that the capacitor begins discharging gradually.

As the i/p AC voltage supply gets the negative half-cycle, then the D1 diode gets reverse biased but the D2 diode is forward biased. Throughout the negative half cycle, the flow of current in the second diode

gets the filter to charge the capacitor. But, the capacitor charging occurs simply while the applied AC voltage is superior to the voltage of the capacitor.

The capacitor in the circuit is not charged fully, so the charging of this does not occur instantly. Once the voltage supply becomes superior to the voltage of the capacitor, the capacitor gets charging. In both the half cycles, the flow of current will be in the similar direction across the RL load resistor. Thus, we acquire either whole positive half cycle otherwise negative half cycle. In this case, we get total positive half cycle.

WE USE THE CAPACITOR FILTER so, the output voltage is superior than that of rectifier without filter because due to charging and discharging of capacitor, it remains significantly close to the highest value of the output voltage of the rectifier.Also, the capacitor filter circuit is very famous due to its features like low cost, less weight, small size, & good characteristics. The capacitor filter circuit is applicable for small load currents.

Schematic Diagram

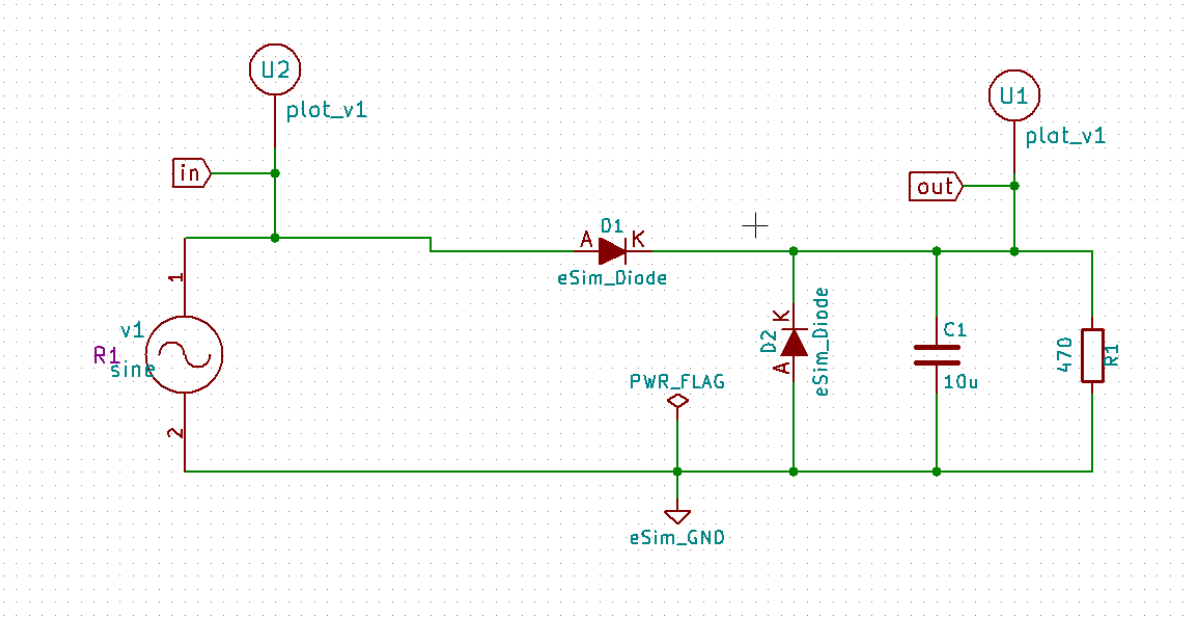

Figure 1: schematic diagram of full wave rectifier with C filter

NgSpice Plots:

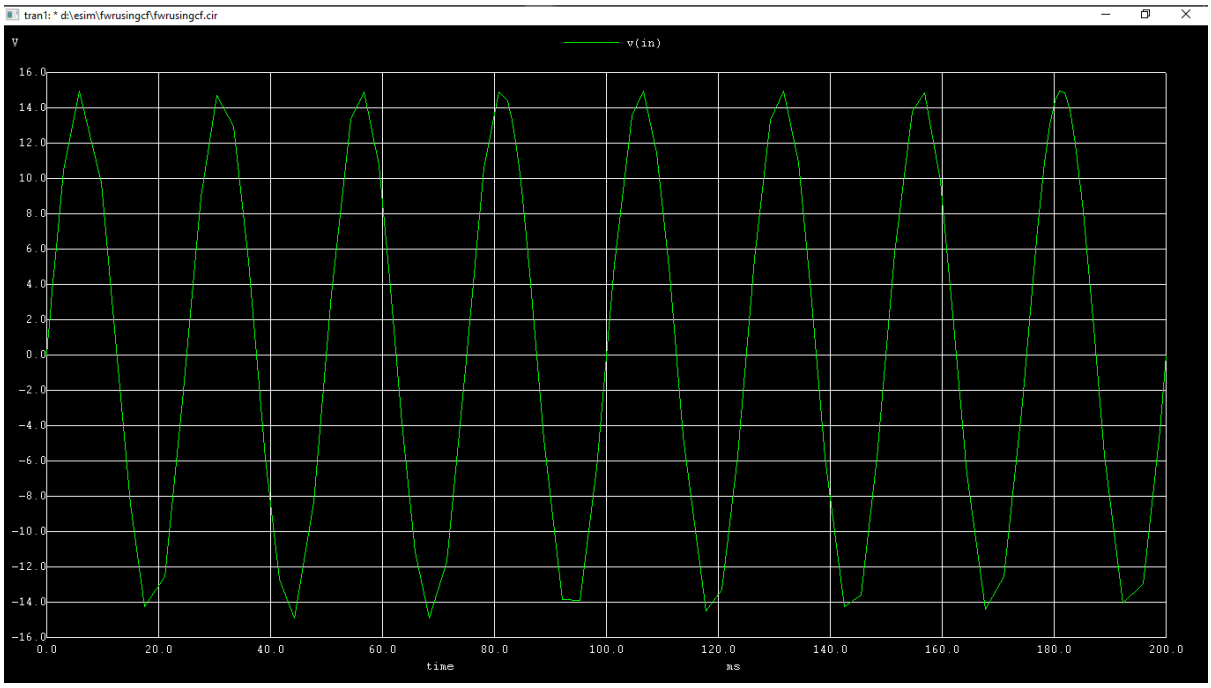

Figure 2: input plot

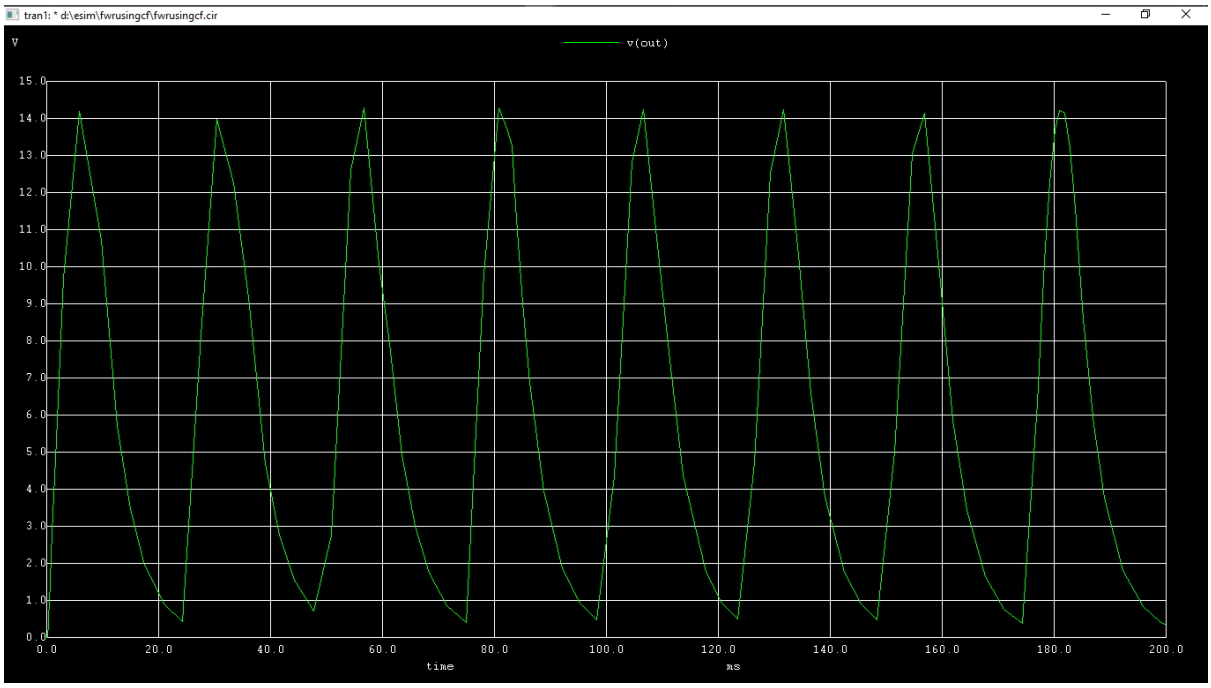

Figure 3: Output plot

PYTHON PLOT:

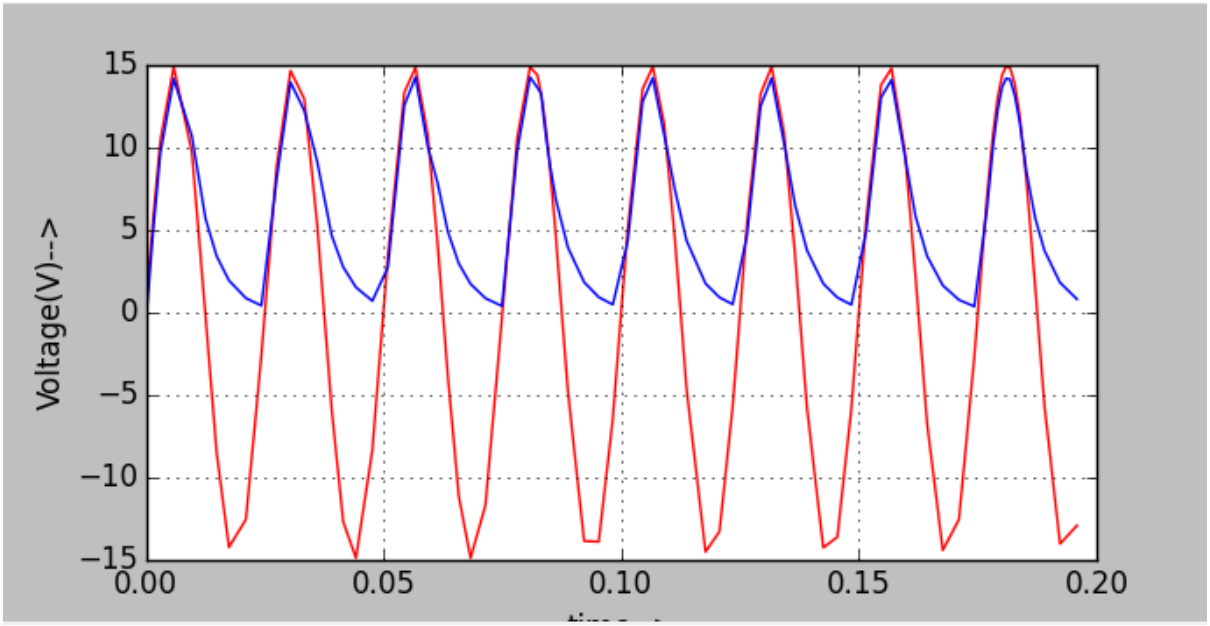

Figure 4: Input in Red ; Rectifed Output in Blue

REFERENCES:

- http://www.circuitstoday.com/filter-circuits
- https://www.elprocus.com/half-wave-and-full-wave-rectifier-with-capacitor-filter/