

Title of the experiment

Analysis of Fullwave Bridge rectifier using eSim.

Theory :

Bridge rectifier of single phase rectifier uses four individual rectifying diodes connected in a closed loop bridge configuration to produce the desired output. The main advantage of this bridge circuit is that it does not require a special centre tapped transformer, thereby reducing its size and cost. The single secondary winding is connected to one side of the diode bridge network and the load to the other side.

The four diodes are arranged in series pairs with only two diodes conducting current during each half cycle. As the current owing through the load is unidirectional, so the voltage developed across the load is also unidirectional, therefore the average DC voltage across the load is $0.637 V_{max}$. However in reality, during each half cycle the current flows through two diodes instead of just one so the amplitude of the output voltage is two voltage drops ($2 \times 0.7 = 1.4 \text{ V}$) less than the input V_{max} amplitude. The ripple frequency is now twice the supply frequency (e.g. 100 Hz for a 50 Hz supply)

Schematic Diagram :

The circuit schematic of fullwave bridge rectifier in eSim is as shown below:

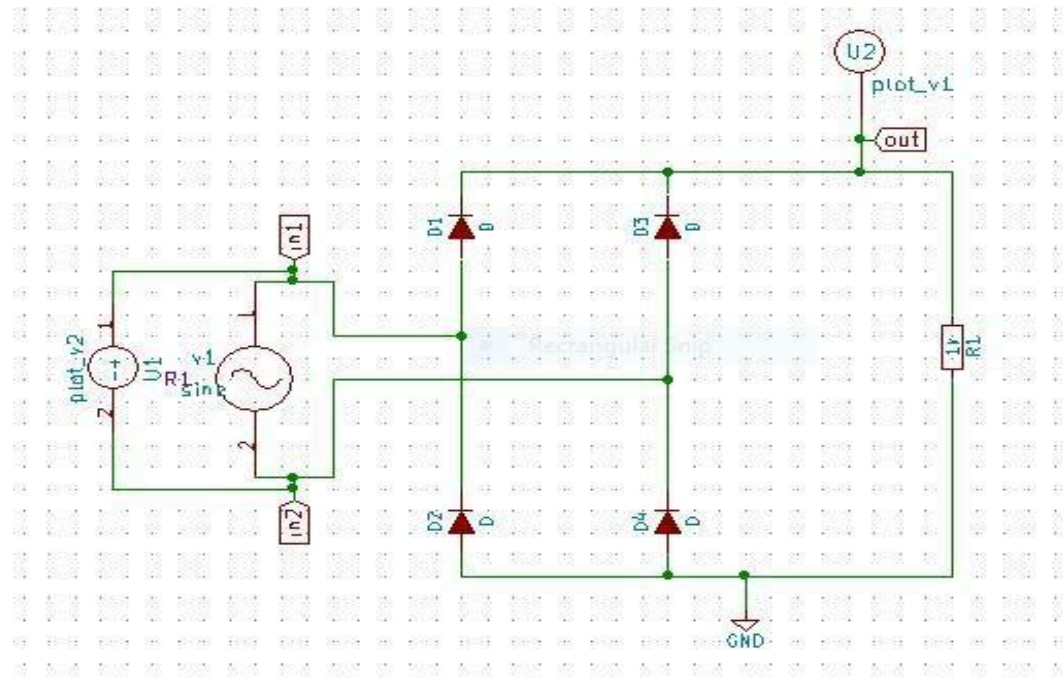


Figure 1: Fullwave Bridge rectifier

Simulation Results :
1. Python plots:

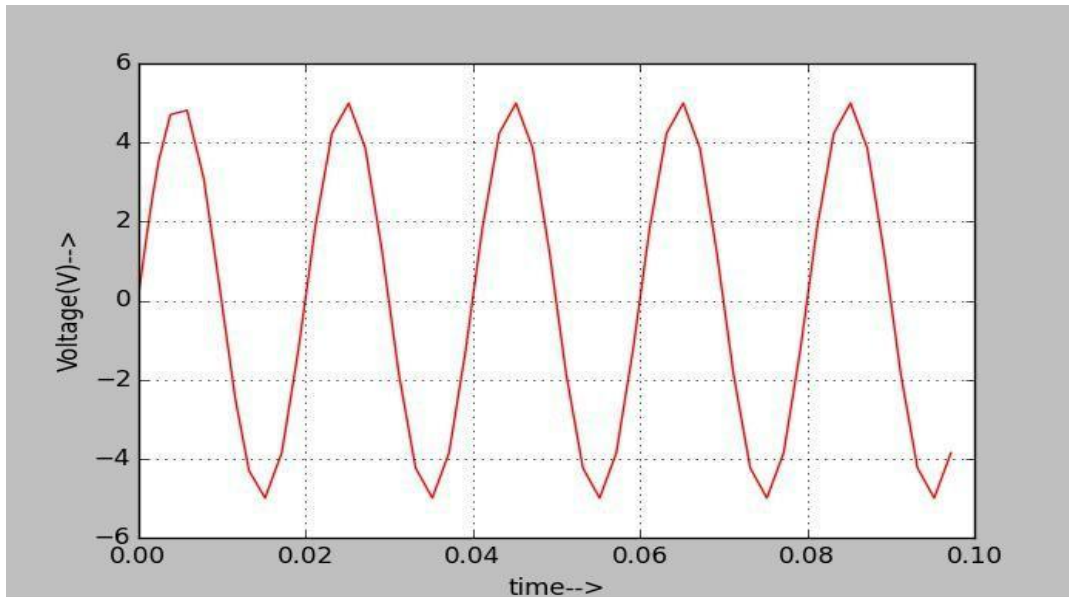


Figure 2: Python Plot Input

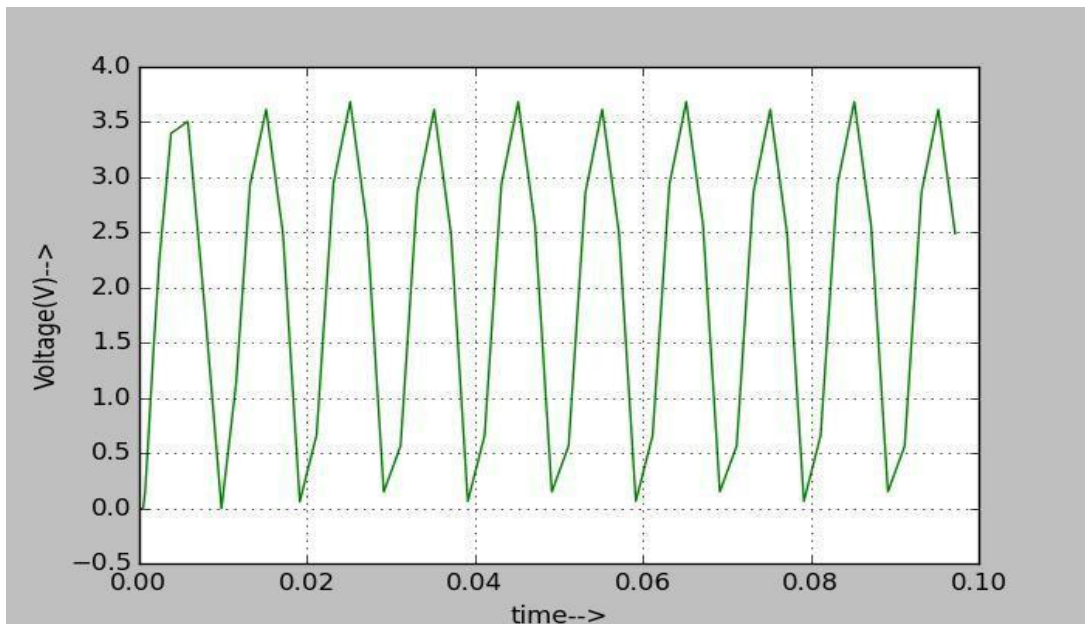


Figure 3: Python Plot Output

2. Ngspice plots:

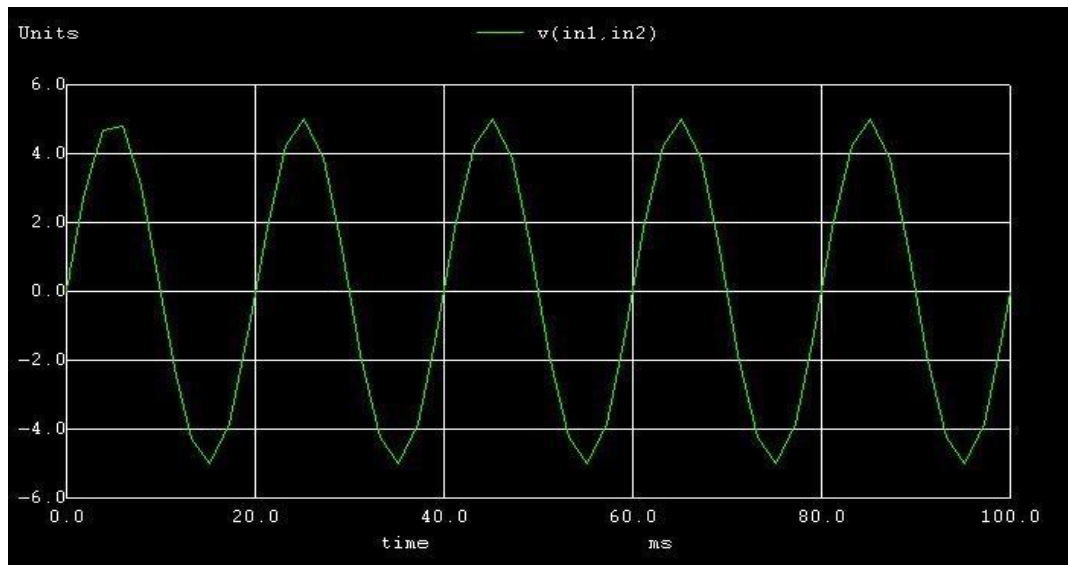


Figure 4: Ngspice Plot Input

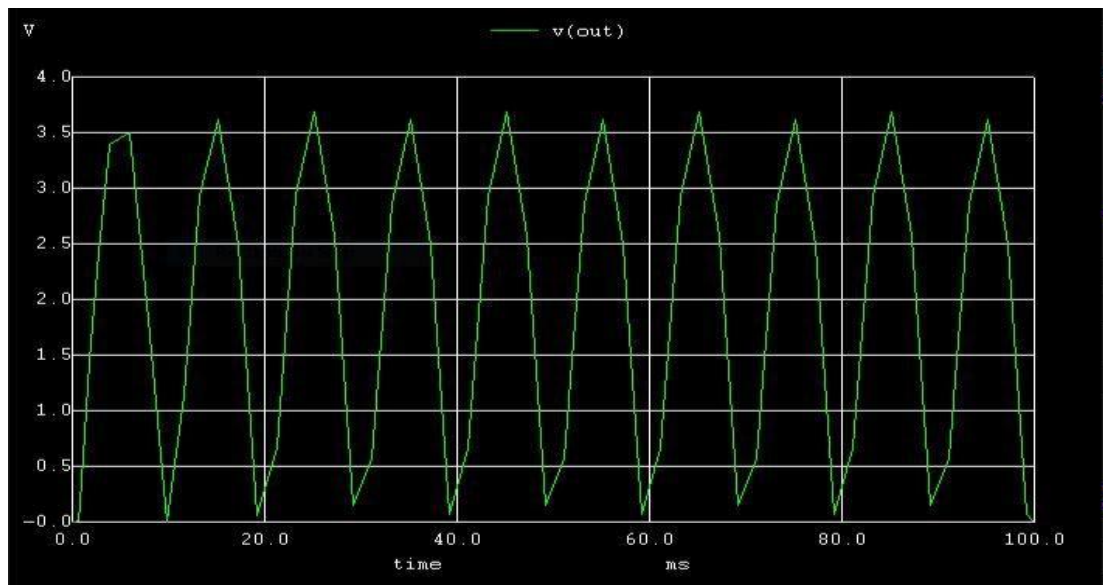


Figure 5: Ngspice Plot Output

References:

[1] http://www.electronics-tutorials.ws/diode/diode_6.html referred on 12/01/2017.