Circuit Simulation Project on

Peak Detector Circuit

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Title of the circuit: Peak Detector Circuit

Theory/Description: Op-amp based peak detector circuit is the modification of basic peak detector circuit, used to remove the voltage drop across the diode. Whenever the applied input voltage signal is greater than the threshold voltage of the diode, the diode will get forward biased and acts as a closed switch. Here, the diode is connected in the feedback and hence the circuit works as a buffer circuit. So, whatever input is applied to the positive terminal of the op-amp will be received at the output terminal.

In the first positive half cycle, the op-amp output is HIGH, so the diode is forward biased. At the same time, the capacitor charges to the highest peak value of the input signal. Here, the circuit is working as a **voltage follower buffer circuit**.

In the first negative half cycle, the op-amp output is LOW so the diode will be reversed biased. Therefore, until the diode again gets forward biased the capacitor holds the peak value of the input signal. In this reverse biased condition of the diode, the op-amp is in open loop condition and goes into saturation, so the capacitor starts discharging into the R_L. That's why you will see the decreasing slope in the negative cycle of the signal.

Applications of Peak detector

1. It is used in the **analysis** of **spectral** and **mass spectrometer**.
2. Peak detector finds its application in destructive testing.
3. It is used for **instrumentation measurement**, mostly in amplitude modulated wave communication.
4. It widely finds applications in **sound measuring instruments**.

Circuit Diagram :

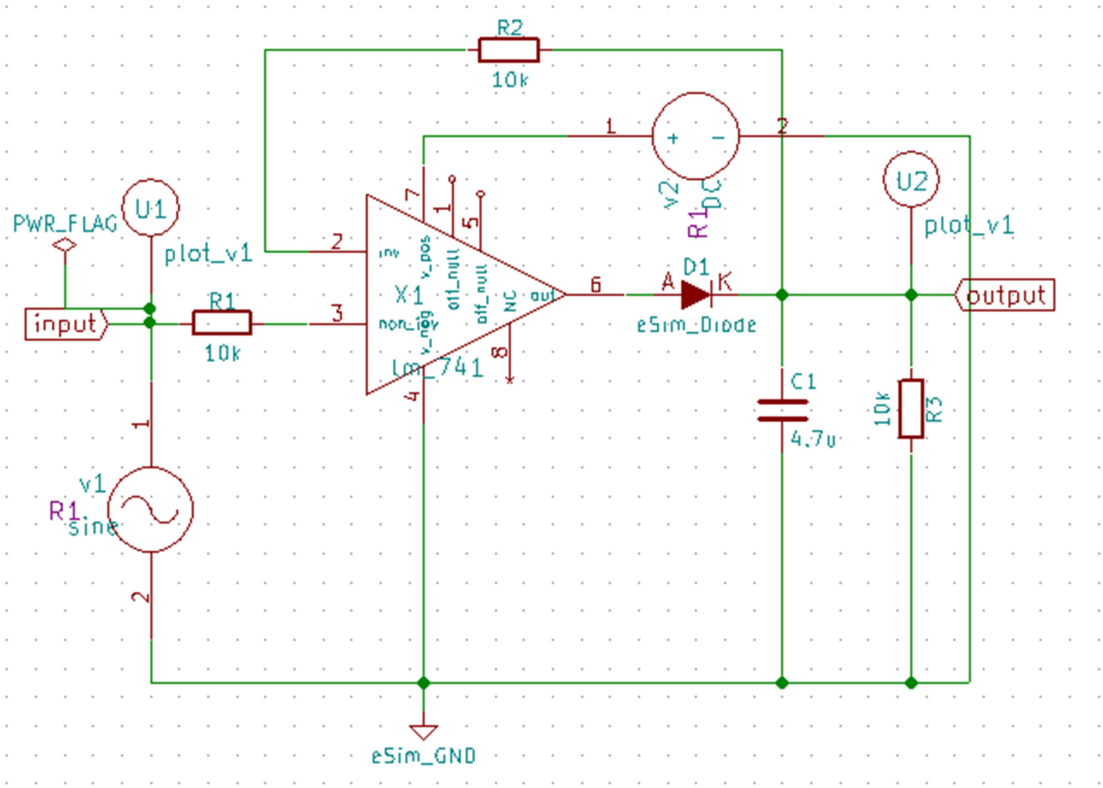
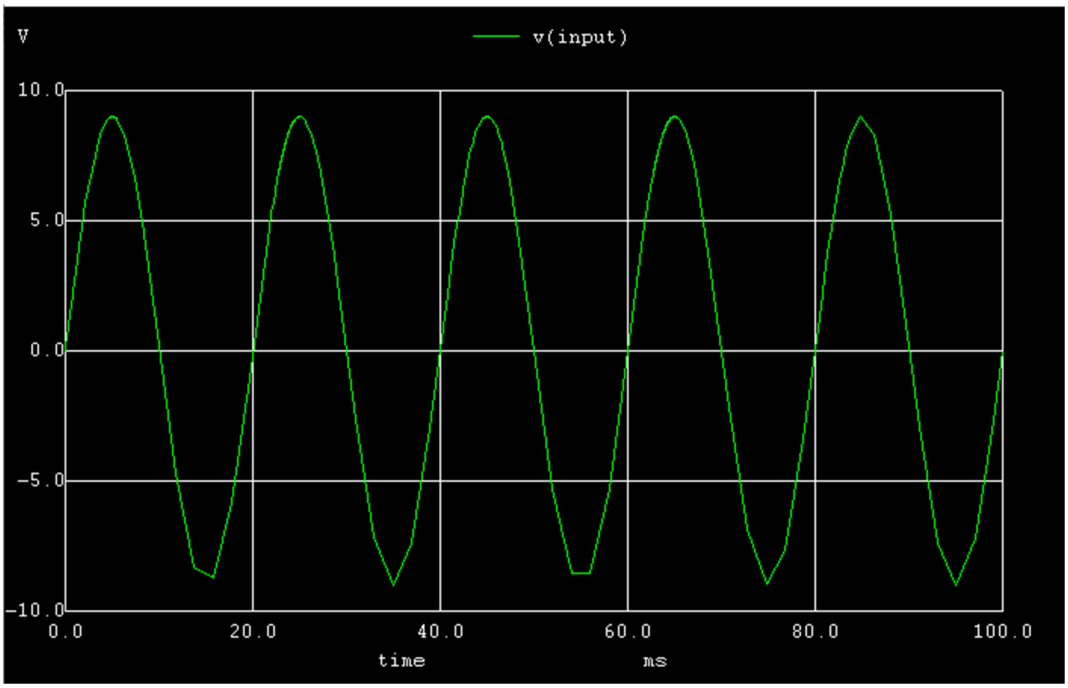
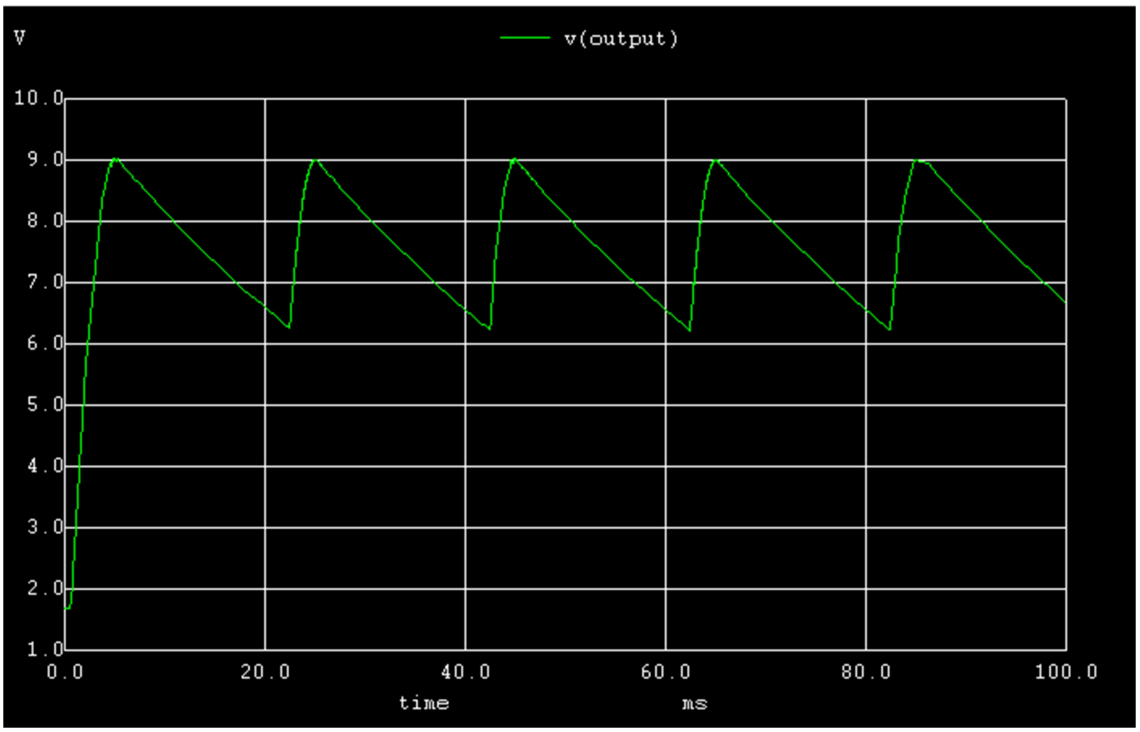


Fig: Schematic of Peak Detector Circuit

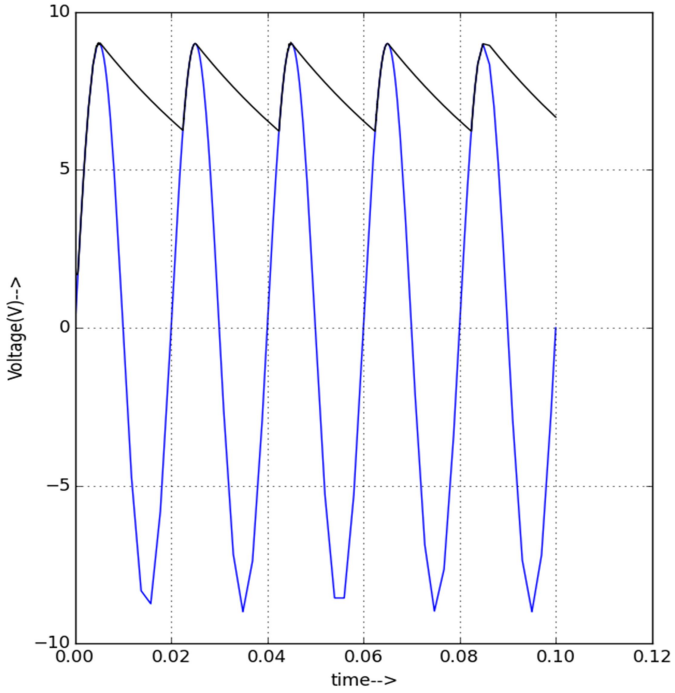
Ngspice plot : Input plot



Ngspice plot : Output plot



Python plot : Input and Output plot



Conclusion: Thus, we have studied the Peak Detector circuit using eSim circuit simulation and the simulation plot of ngspice and python plot obtained in eSim.

Source/Reference(s):

1. https://circuitdigest.com/electronic-circuits/peak-detector-circuit-using-op-amp-lm741
2. https://electronicscoach.com/peak-detector.html
3. https://www.electronics-tutorial.net/analog-integrated-circuits/peak-detector/