EXPERIMENT NO: 2(a)

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Aim of the Experiment:

Analysis of clipper circuit using eSim.

Theory:

The Diode Clipper, also known as a Diode Limiter, is a wave shaping circuit. It takes an input waveform and clips or cuts off its top half, bottom half or both halves together to produce an output waveform that resembles a flattened version of the input. Diode Clipping Circuits can be used for a variety of applications to modify an input waveform using signal and Schottky diodes or to provide over-voltage protection using Zener Diodes. It ensures that the output voltage never exceeds a certain level protecting the circuit from high voltage spikes. Then diode clipping circuits can be used in voltage limiting applications.

Procedure:

1. Create the schematic of the Clipper circuit as shown in Figure-1.
2. Annotate the schematic.
3. Test Electric rules.
4. Generate the netlist.
5. Insert analysis for transient analysis from 0 to 100 ms with a step time of 10 ms.
6. Insert Source Details.
7. Add D.lib model in Device Modeling.
8. Convert KiCad netlist to Ngspice netlist.
9. Simulate the Ngspice netlist using Ngspice simulator.

Source Parameters:

Following are the input sine wave parameters:

1. Enter Offset Value- 0
2. Enter Amplitude - 5
3. Enter Frequency- 50
4. Enter Delay Time- 0
5. Enter Damping Factor- 0

Schematic Diagram:

The circuit schematic of Clipper circuit in eSim is as shown below:

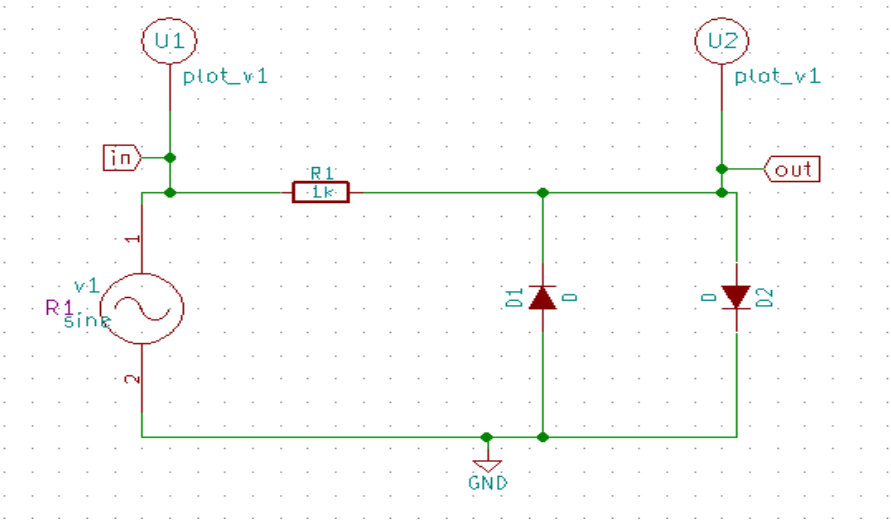

Figure 1: Clipper Circuit

Simulation Results:

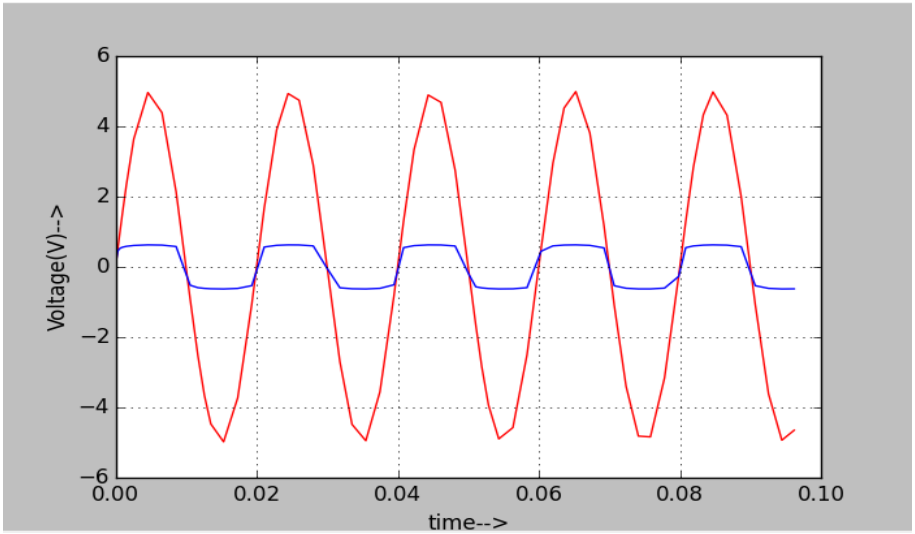

Figure 2: Python Plot

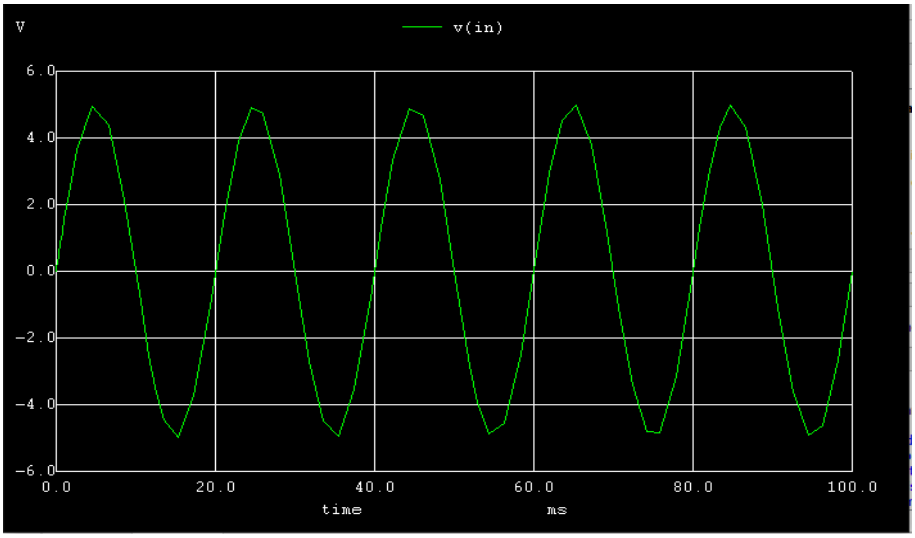

Figure 3: Ngspice Input Plot

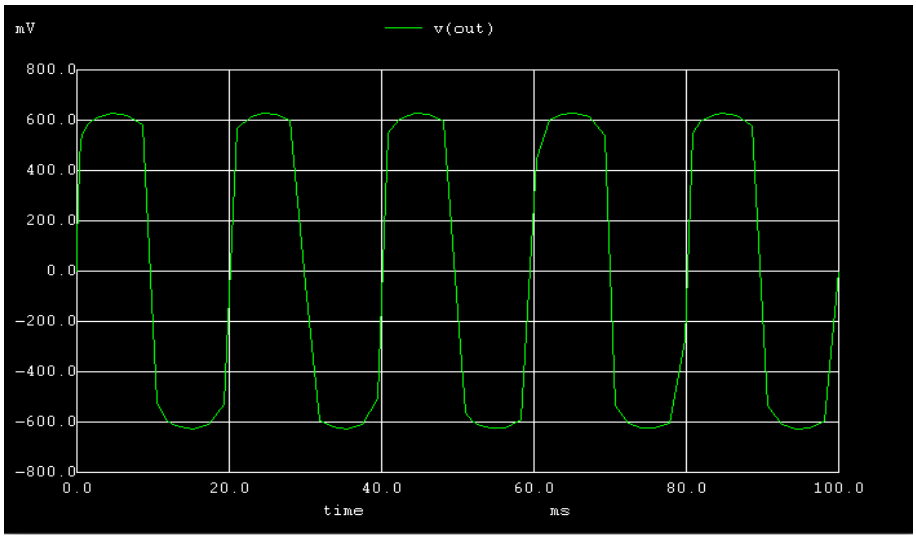

Figure 4: Ngspice Output Plot

Conclusion:

Thus, we have studied the diode application as a clipper circuit using eSim and we get the appropriate waveforms.

References:

http://www.electronics-tutorials.ws/diode/diode-clipping-circuits.html

EXPERIMENT NO: 2(b)

Aim of the Experiment:

Analysis of clamper circuit using eSim.

Theory:

A clamping circuit is used to place either the positive or negative peak of a signal at a desired level. The dc component is simply added or subtracted to/from the input signal. The clamper is also referred to as an IC restorer and ac signal level shifter. A clamp circuit adds the positive or negative dc component to the input signal so as to push it either on the positive side or on the negative side.

The circuit will be called a **positive clamper** , when the signal is pushed upward by the circuit. When the signal moves upward, the negative peak of the signal coincides with the zero level. The circuit will be called a **negative clamper** , when the signal is pushed downward by the circuit. When the signal is pushed on the negative side the positive peak of the input signal coincides with the zero level.

Procedure:

1. Create the schematic of the Clamper circuit as shown in Figure-1.
2. Annotate the schematic.
3. Test Electric rules.
4. Generate the netlist.
5. Insert analysis for transient analysis from 0 to 100 ms with a step time of 10 ms.
6. Insert Source Details.
7. Add D.lib model in Device Modeling.
8. Convert KiCad netlist to Ngspice netlist.
9. Simulate the Ngspice netlist using Ngspice simulator.

Source Parameters:

Following are the input sine wave parameters:

1. Enter Offset Value- 0
2. Enter Amplitude - 5
3. Enter Frequency- 50
4. Enter Delay Time- 0
5. Enter Damping Factor- 0

Schematic Diagram:

The circuit schematic of Clamper circuit in eSim is as shown below:

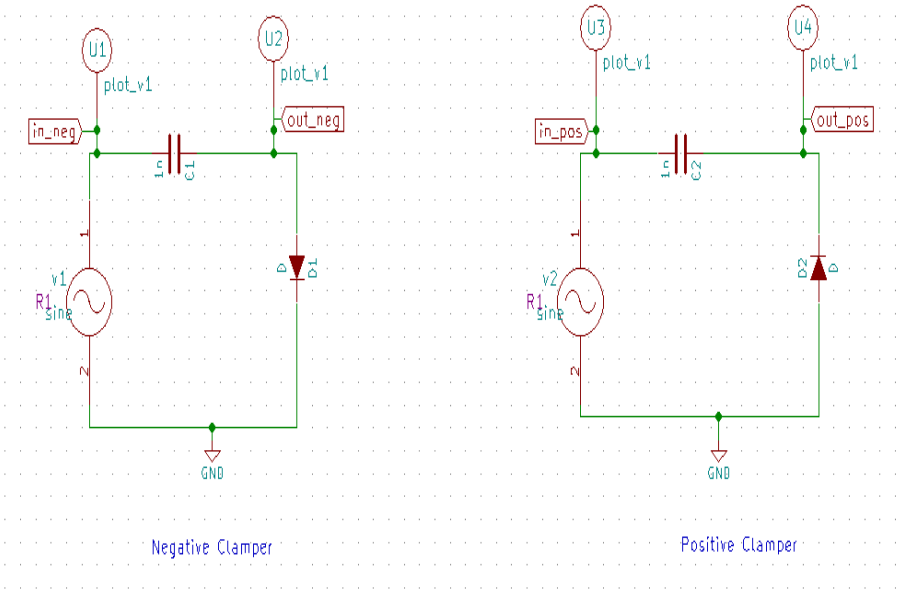

Figure 1: Clamper Circuit

Simulation Results:

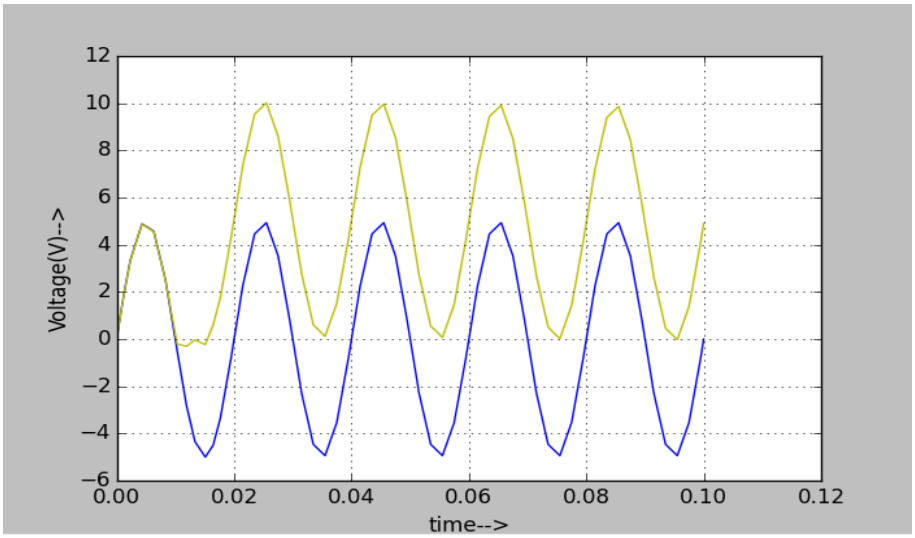

Figure 2: Positive Clamper Python Plot

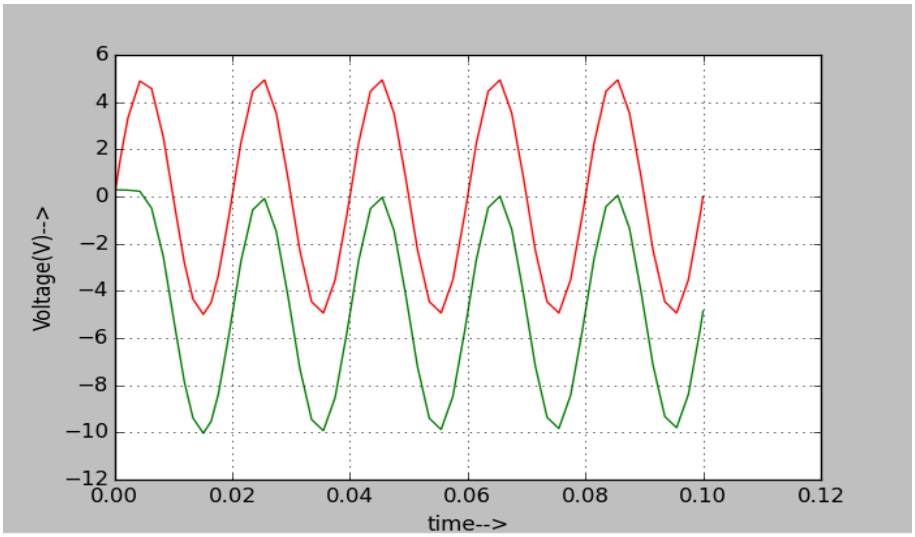

Figure 3: Negative Clamper Python Plot

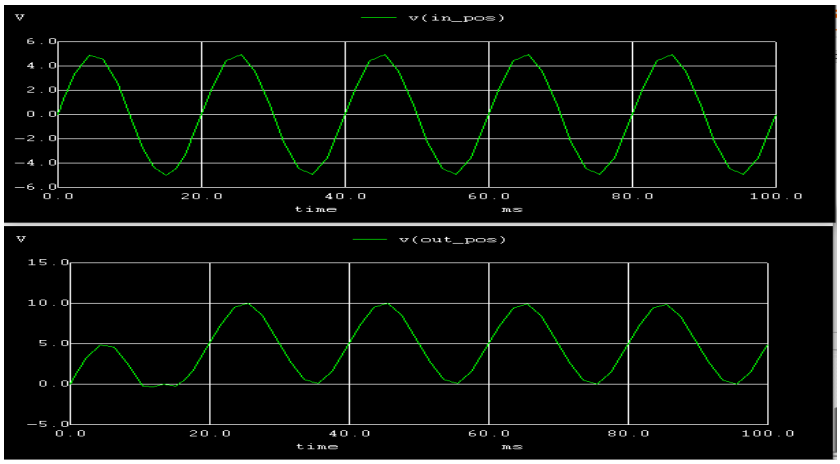

Figure 4: Positive Clamper Ngspice Plot

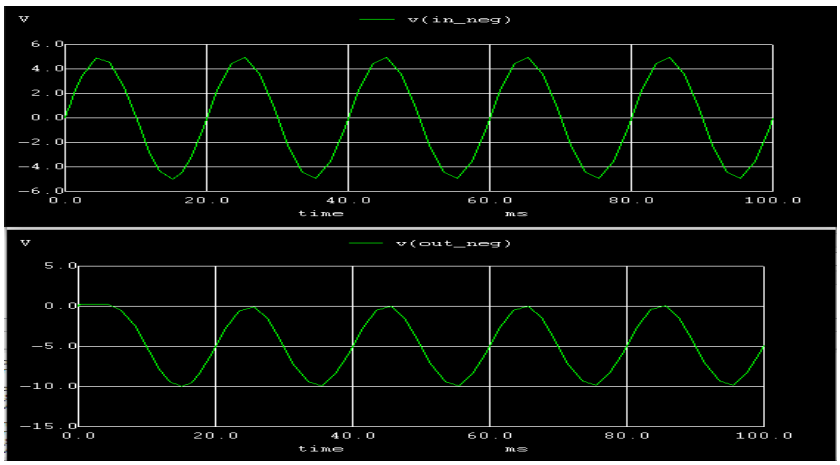

Figure 5: Negative Clamper Ngspice Plot

Conclusion:

Thus, we have studied the diode application as a clamper circuit using eSim and we get the appropriate waveforms.

References:

http://www.circuitstoday.com/diode-clamping-circuits