

Expt. No. 5 Simulation of AC Voltage Controller

Aim: To perform transient analysis of AC voltage controller

Components Required with references:

1. Sine wave source (sine)
2. Resistors (R) 100Ω , $10K\Omega$, 250Ω
3. Capacitors (C) $0.1\mu F$
4. Diac (diac)
5. Triac (triac)
6. Voltmeters (vplot1, vplot)
7. Ground (gnd)

Procedure :

1. Create the schematic of the AC voltage controller as shown in Fig. 5.1.
2. As there is no diac in the library of FreeEDA take a diode and change the value of the diode to diac
3. Change the reference of the triac and diac from U to X.
4. Annotate the schematic.
5. Test Electric rules.
6. Generate the netlist.
7. Insert analysis for transient analysis from 0 to 20 ms with a step time of $20\mu s$.
8. Import the subcircuit of triac and diac.
9. Edit model for diode (set $bv=1800$ and $I_s=2.2E-15$).
10. Convert KiCad netlist to Ngspice netlist.
11. Simulate the Ngspice netlist using Ngspice simulator.

Conclusion : Transient analysis of AC voltage controller is performed.

FreeEDA schematic of AC voltage controller :

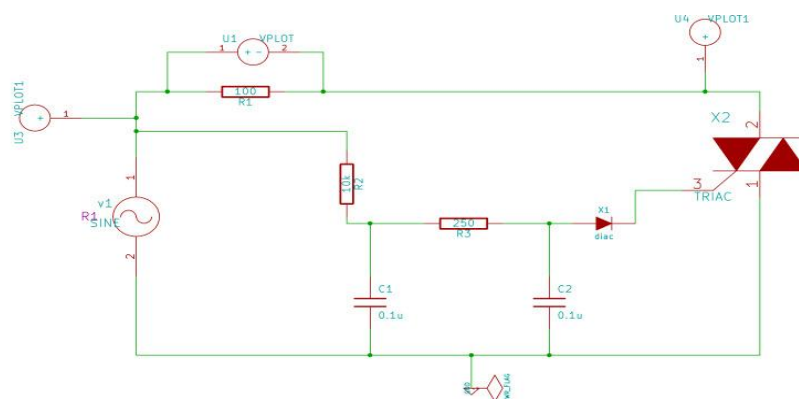


Fig. 5.1 FreeEDA schematic of AC Voltage controller

Parameters of input:

Parameters of Sine wave source :

Offset : 0
Amplitude : 100
Frequency : 100
Delay : 0
Damping factor : 0

Simulation Results :

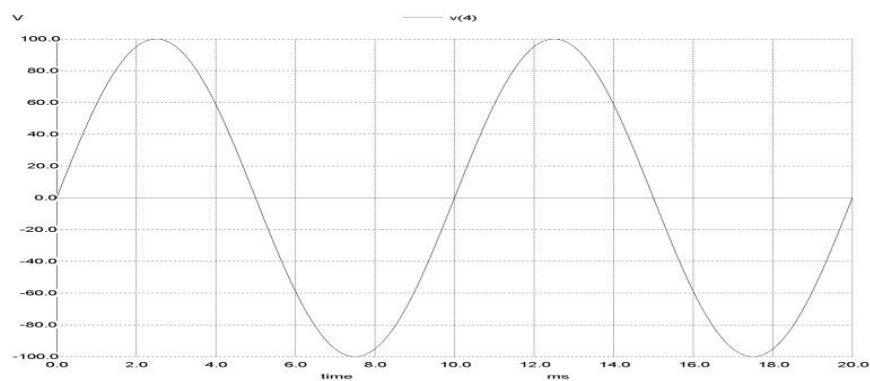


Fig. 5.2 Input waveform

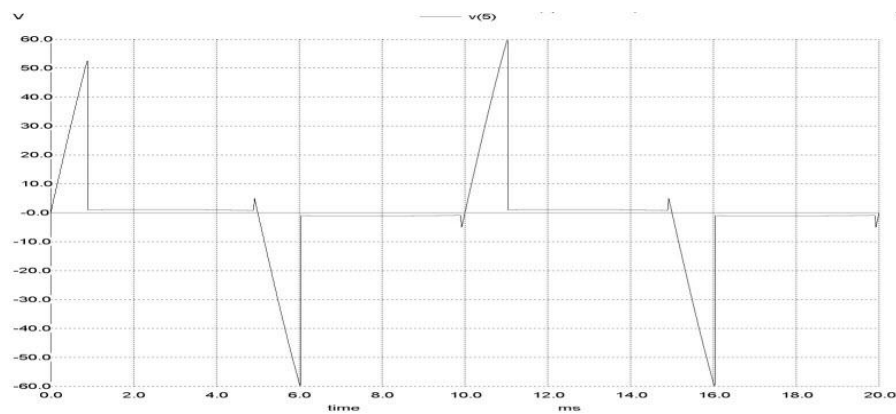


Fig. 5.3 Voltage across triac

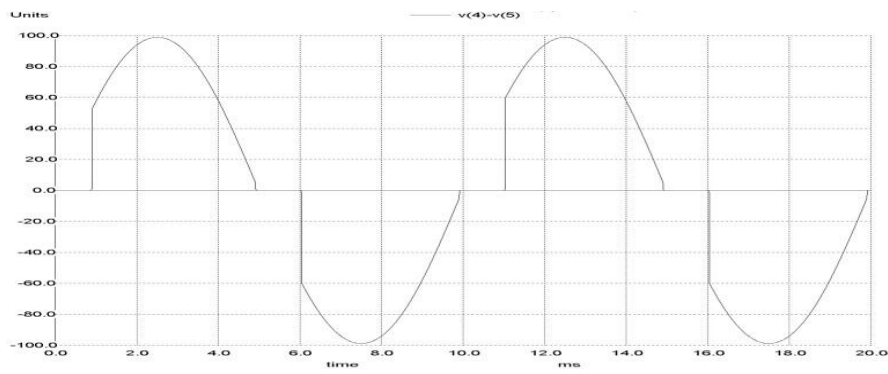


Fig. 5.4 Load voltage