

## Expt. No. 3 Simulation of Voltage commutated chopper

**Aim:** To perform transient analysis of voltage commutated chopper

### Components required with references:

1. DC source (DC)
2. Diode (diode)
3. Resistor (R) of  $100\Omega$
4. SCR (scr)
5. Voltmeters (vplot1 and vplot)
6. Ground (gnd)
7. Capacitor (C) of  $6.8\ \mu\text{F}$ .
8. Inductor (inductor) of  $500\ \mu\text{H}$ .

### Procedure :

1. Create the schematic of the voltage commutated chopper as shown in Fig. 3.1.
2. Change the reference of the SCR from U to X.
3. Annotate the schematic.
4. Test Electric rules.
5. Generate the netlist.
6. Insert analysis for transient analysis from 0 to 20 ms with a step time of  $20\ \mu\text{s}$ .
7. Import the subcircuit of SCR.
8. Edit model for diode (set  $bv=1800$  and  $I_s=2.2\text{E-}15$ ).
9. Convert KiCad netlist to Ngspice netlist.
10. Simulate the Ngspice netlist using Ngspice simulator.

**Conclusion :** Transient analysis of voltage commutated chopper is performed using FreeEDA.

### FreeEDA schematic of voltage commutated chopper :

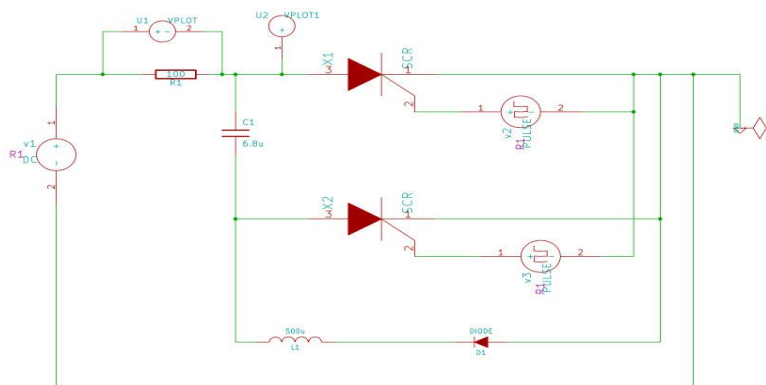


Fig. 3.1 FreeEDA schematic of voltage commutated chopper.

## Parameters of Input :

**DC Input : 10**

## Parameters of pulse for SCR 1 :

Initial : 0  
Pulsed : 5  
Delay : 0  
Rise time : 0  
Fall time : 0  
Pulse width : 3m  
Pulse period : 5m

## Parameters of pulse for SCR 2 :

Initial : 0  
Pulsed : 5  
Delay : 3m  
Rise time : 0  
Fall time : 0  
Pulse width : 2m  
Pulse period : 5m

## Simulation results :

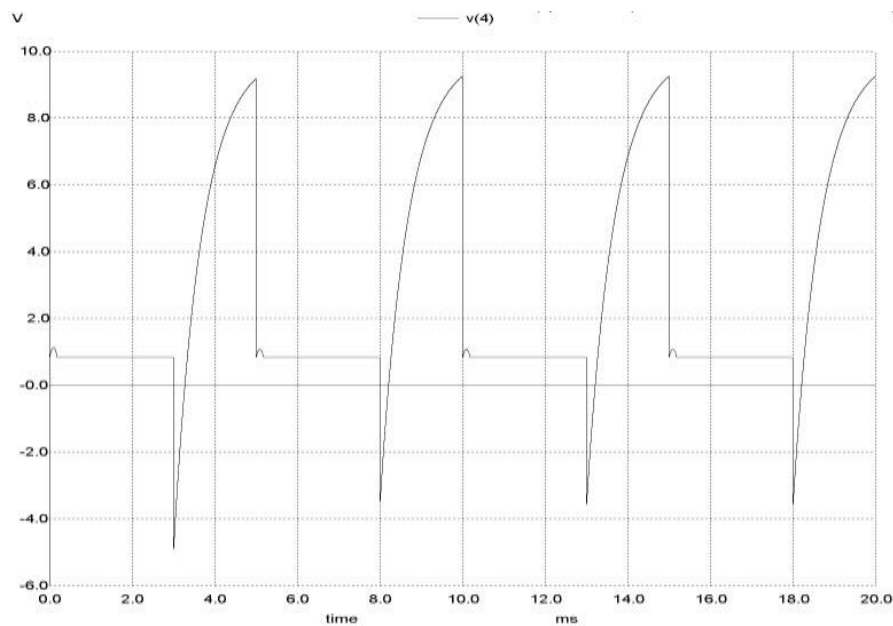


Fig. 3.2 SCR1 voltage

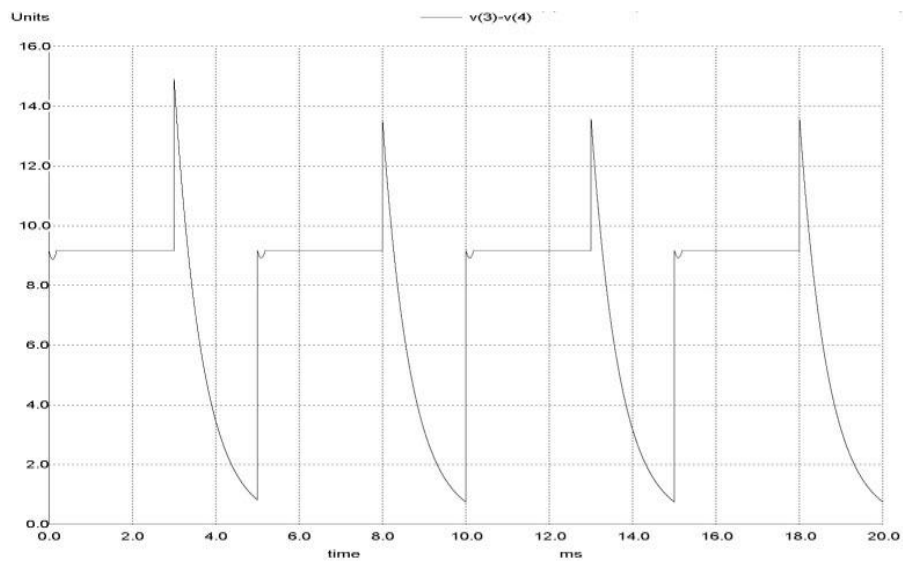


Fig. 3.2 Load voltage