Single-Phase AC Voltage Controller with R load

Circuit Simulation done by:

Ms. P. Suji Garland, Assistant professor

Department of EEE,

St.Xavier's Catholic College of Engineering, Nagercoil

Theory:

Thyristor T1 and diode D1 are forward biased during the positive half cycle of input supply. When thyristor T1 is triggered at a delay angle α , Thyristor T1 and diode D1 conduct together from ω α t = to π during the positive half cycle. The thyristor T2 and diode D2 are forward biased during the negative half cycle of input supply, when trigged at a delay angle α , thyristor T2 and diode D2 conduct together during the negative half cycle from ω πα t = + ( ) to 2π . In this circuit as there is one single common cathode point, routing of the gate trigger pulses to the thyristor gates of T1 and T2 is simpler and only one isolation circuit is required.

Circuit Diagram :

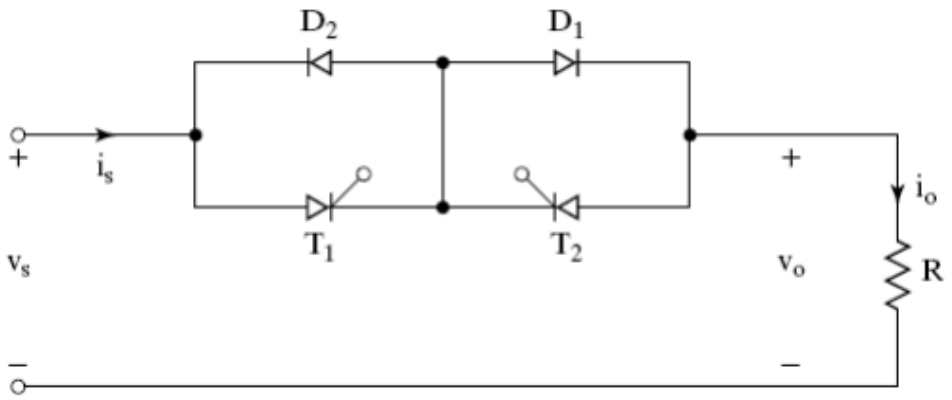

Fig 1: Circuit diagram of Single-Phase AC Voltage Controller with R load

Model Graph:

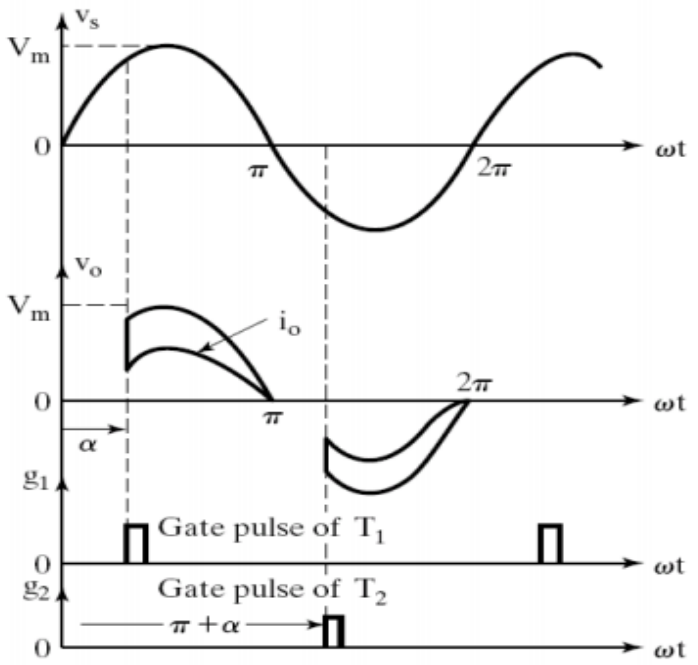

Fig 2: Model graph of Single-Phase Voltage Controller

Schematic Diagram:

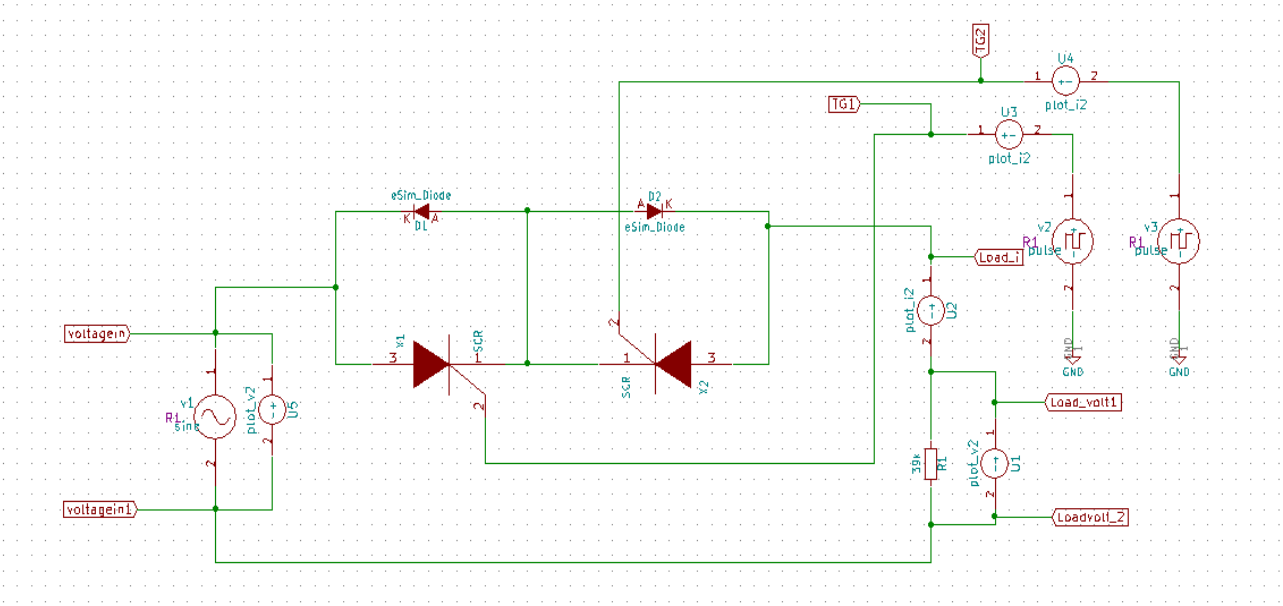

Fig 3: Schematic Diagram of Single-Phase AC Voltage Controller with R load

Note:

R1 = 39k Supply

Voltage = 230 V 50 Hz

Firing Angle for Thyristor1 is 60^0 that is 0.0033sec

Firing Angle for Thyristor2 is 60^0+180^0 that is 0.0133sec

Simulation Results:

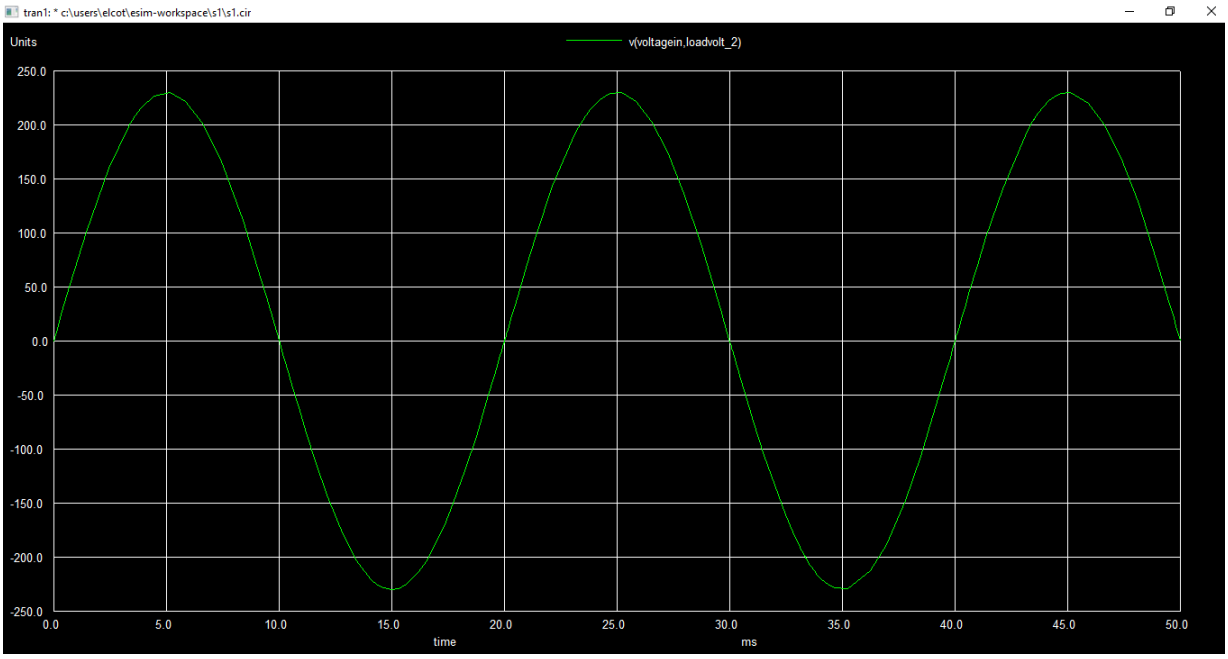

Fig 4 : Ngspice plot of AC input

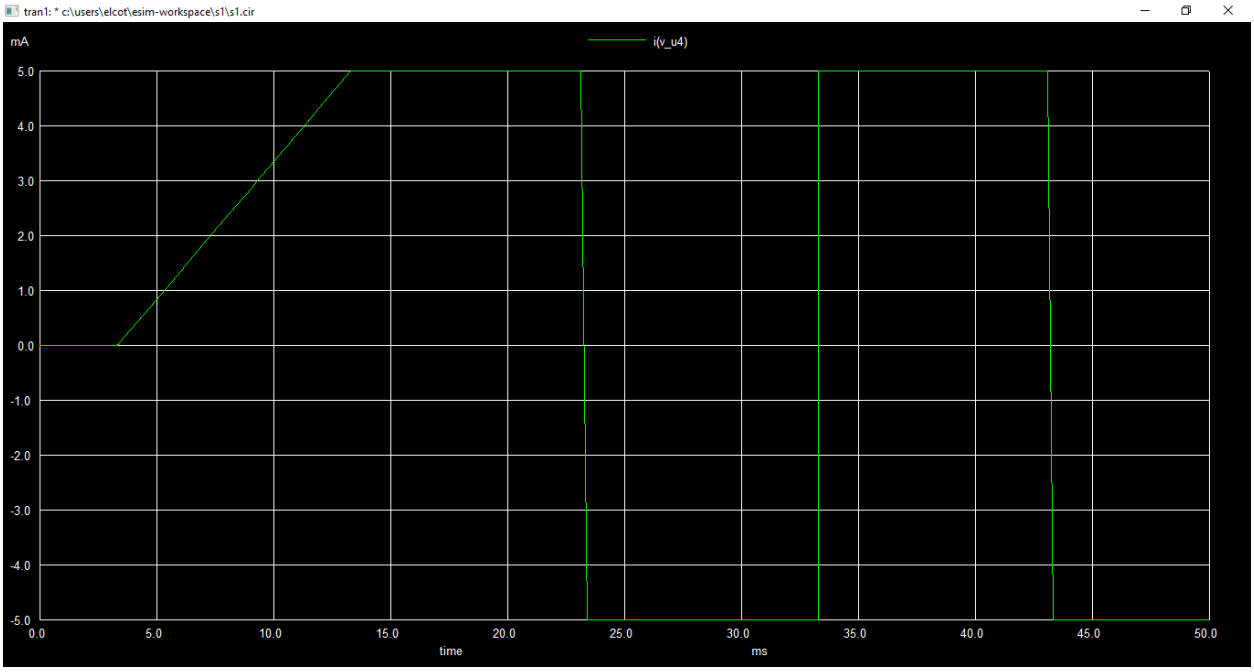

Fig 5 : Ngspice plot of Gate pulse1

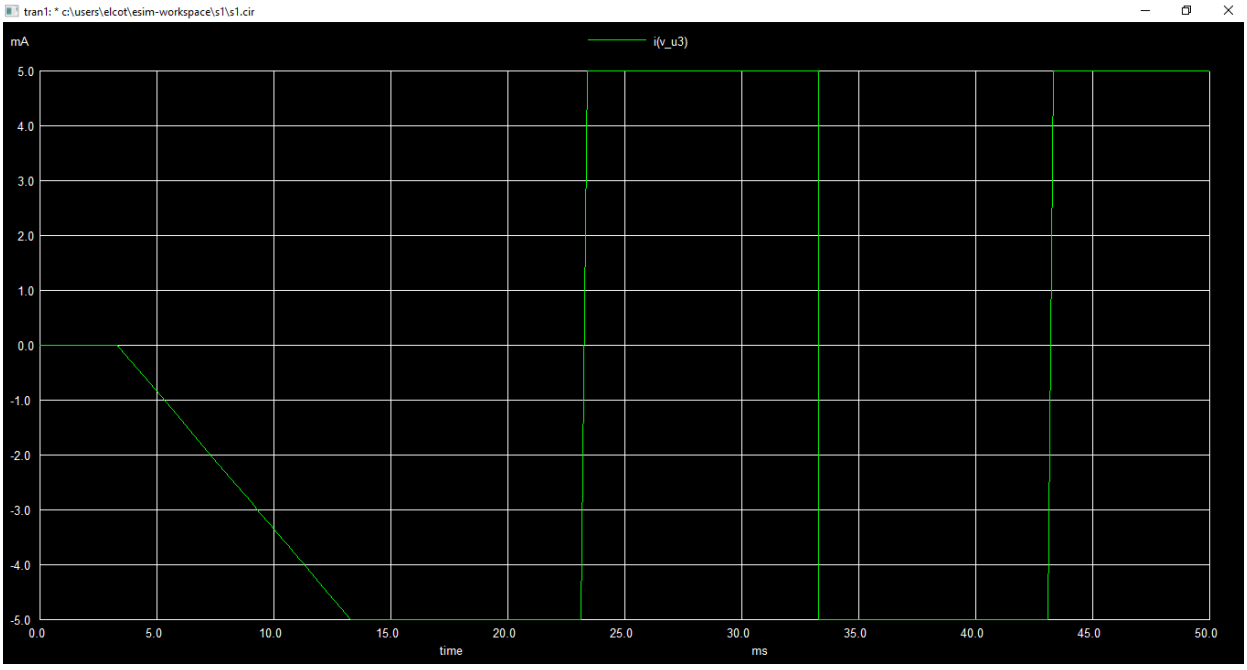

Fig 6 : Ngspice plot of Gate pulse2

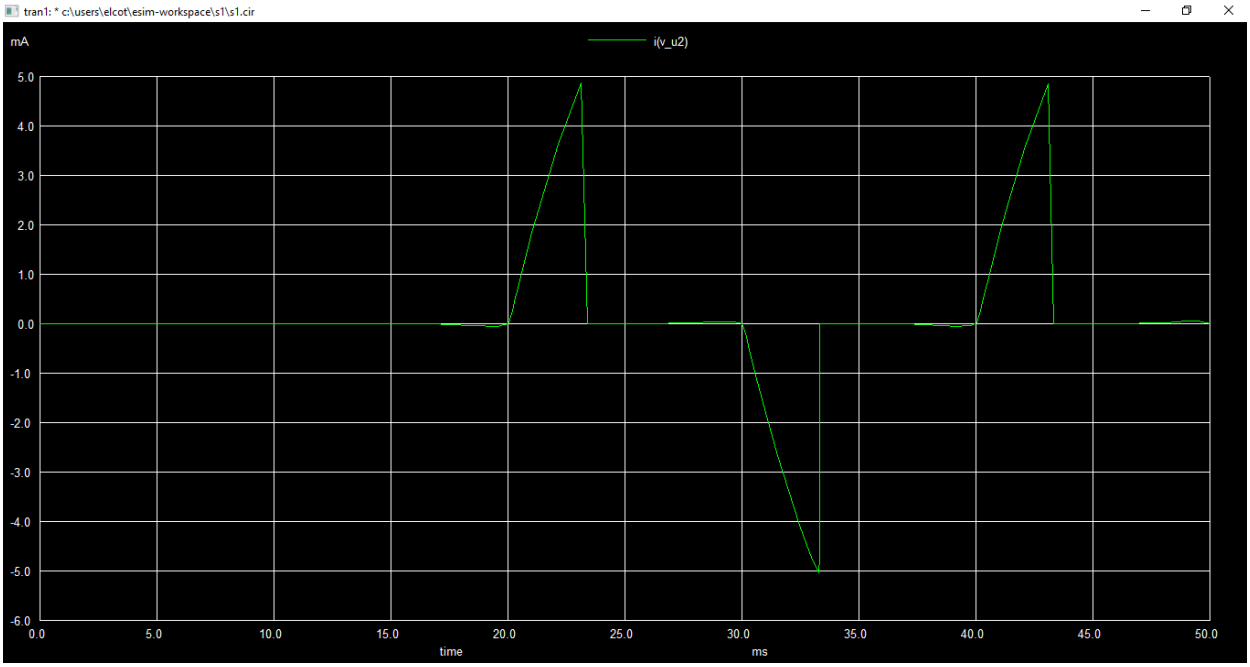

Fig 7 : Ngspice plot of Load current

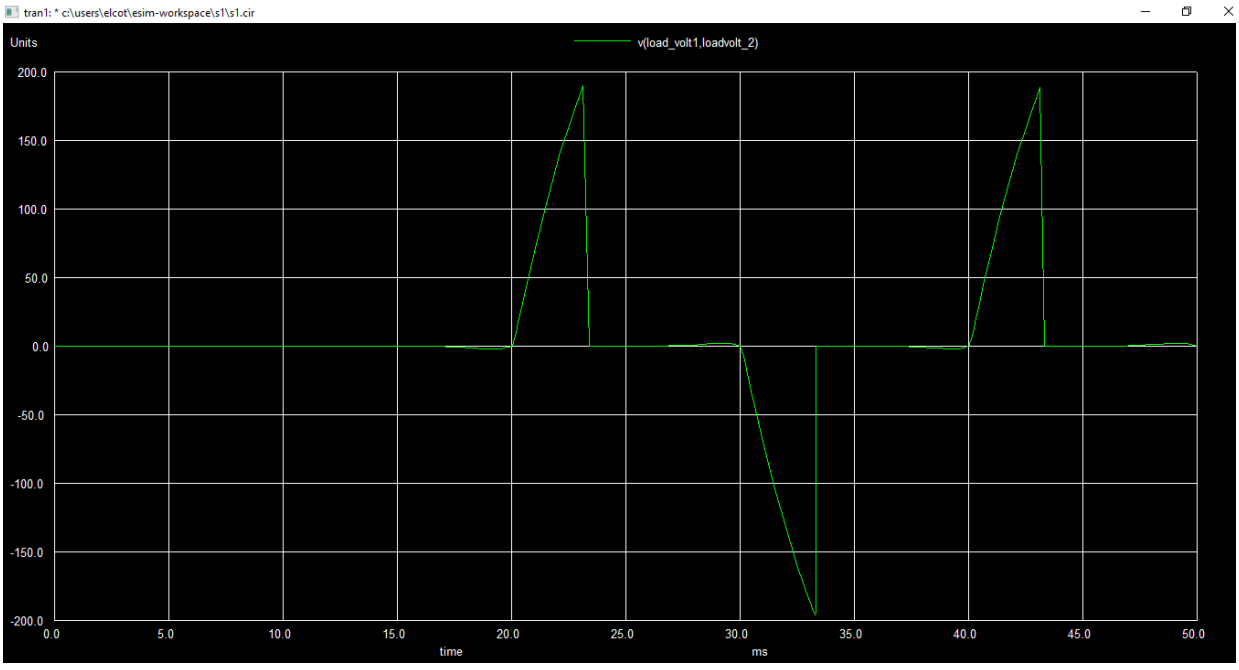

Fig 8 : Ngspice plot of Load Voltage

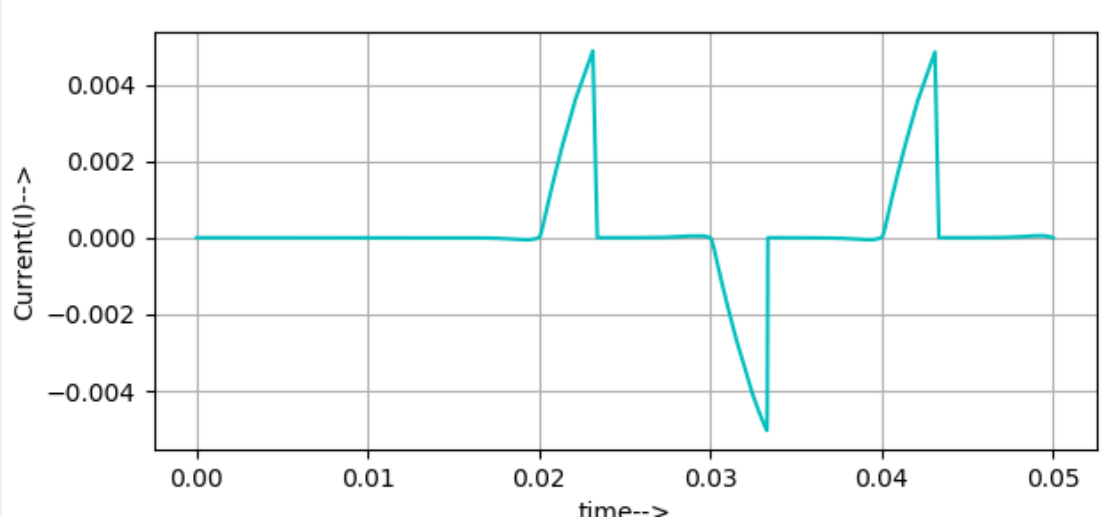

Fig 9 : Python plot of load current

Reference :

http://www.alphace.ac.in/downloads/notes/ece/10EC73.pdf