

Sinusoidal Pulse Width Modulation

<https://esim.fossee.in/circuit-simulation-project>

Name of the participant: Rachith H

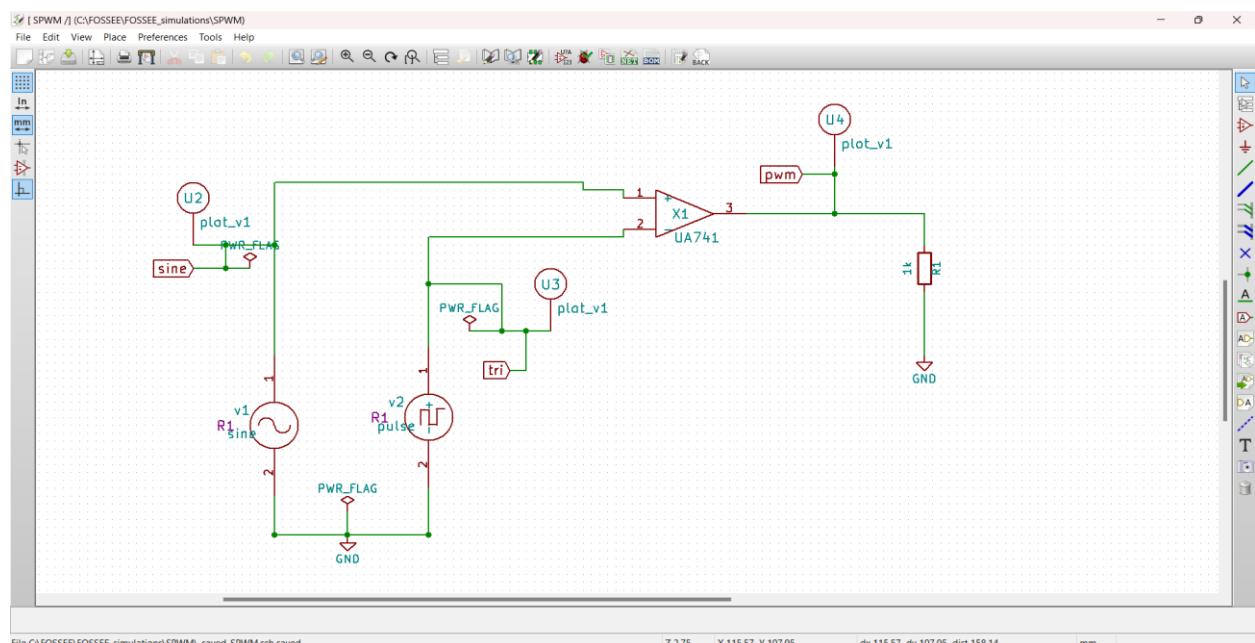
Institute: Bapuji Institute of Engineering and Technology

University: Visvesvaraya Technological University

Title of the circuit: Sinusoidal Pulse Width Modulation - SPWM

Theory/Description: Sinusoidal Pulse Width Modulation (SPWM) is a technique primarily used in power electronics to control the voltage and current supplied to electrical devices. In SPWM, a sinusoidal reference wave is compared with a high-frequency triangular carrier wave to generate modulated pulse signals. The width of these pulses varies in accordance with the sinusoidal wave's amplitude, allowing SPWM to effectively encode the analog sine waveform into a series of digital pulses. This modulation method is widely applied in inverters and motor drives due to its ability to produce a clean output with reduced harmonic distortion. By adjusting the frequency and amplitude of the sine reference wave, SPWM enables precise control over the AC output, making it valuable in applications where stability and efficiency are crucial.

Circuit Diagram(s):

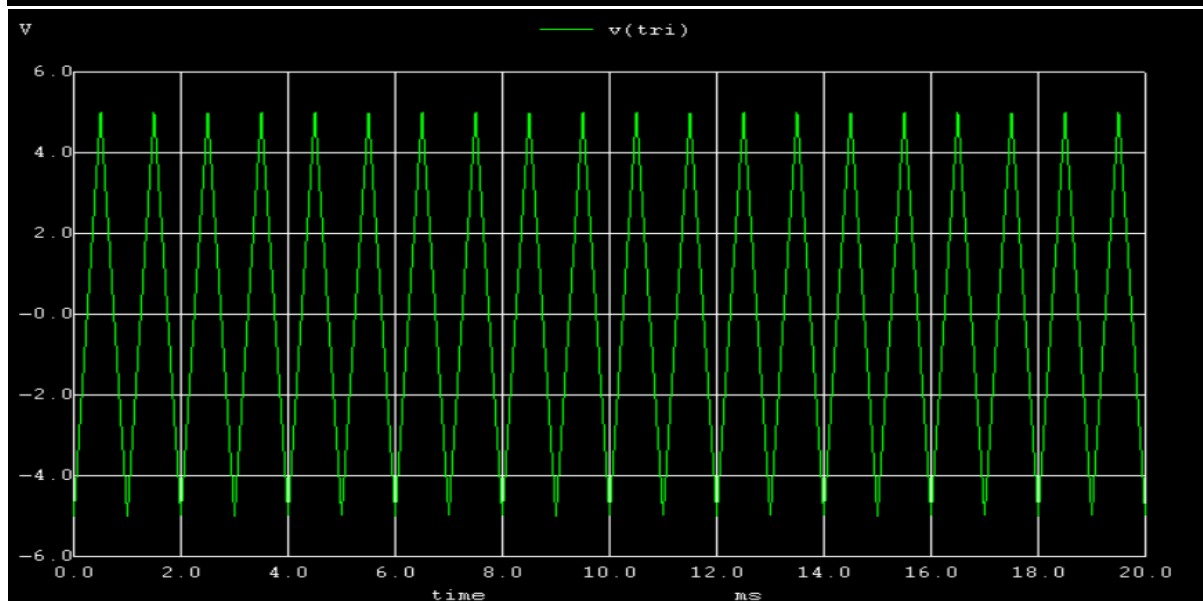
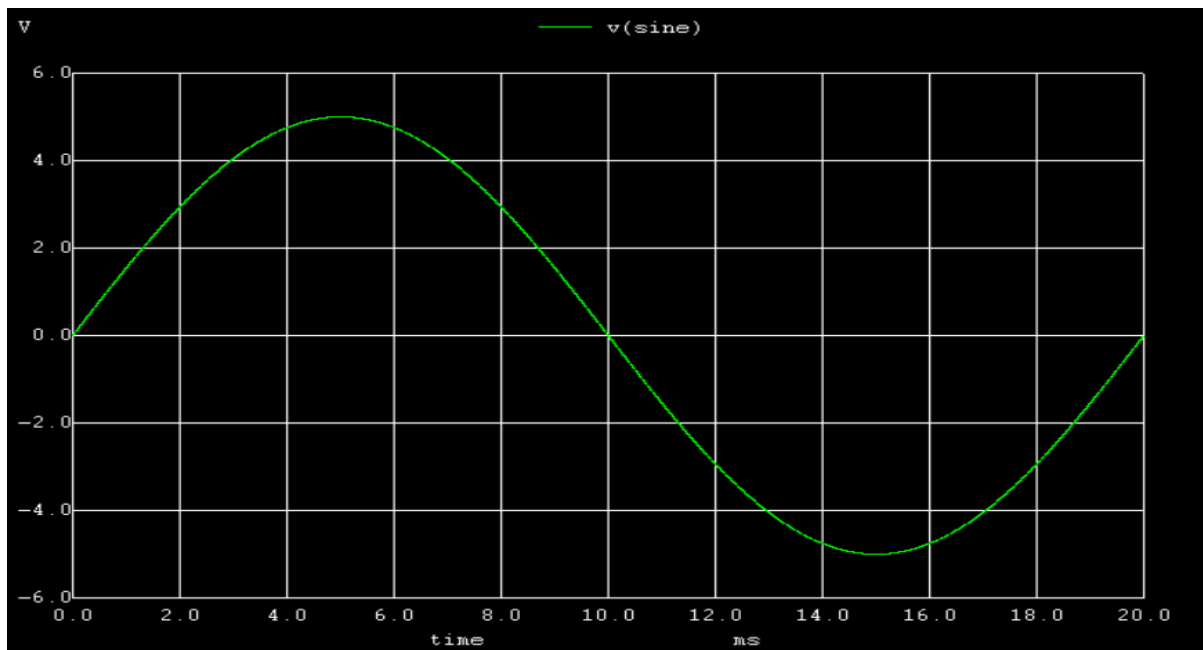


NOTE: A Pulse source is used in the simulation whose parameters have been modified as follows in order to obtain a triangular waveform.

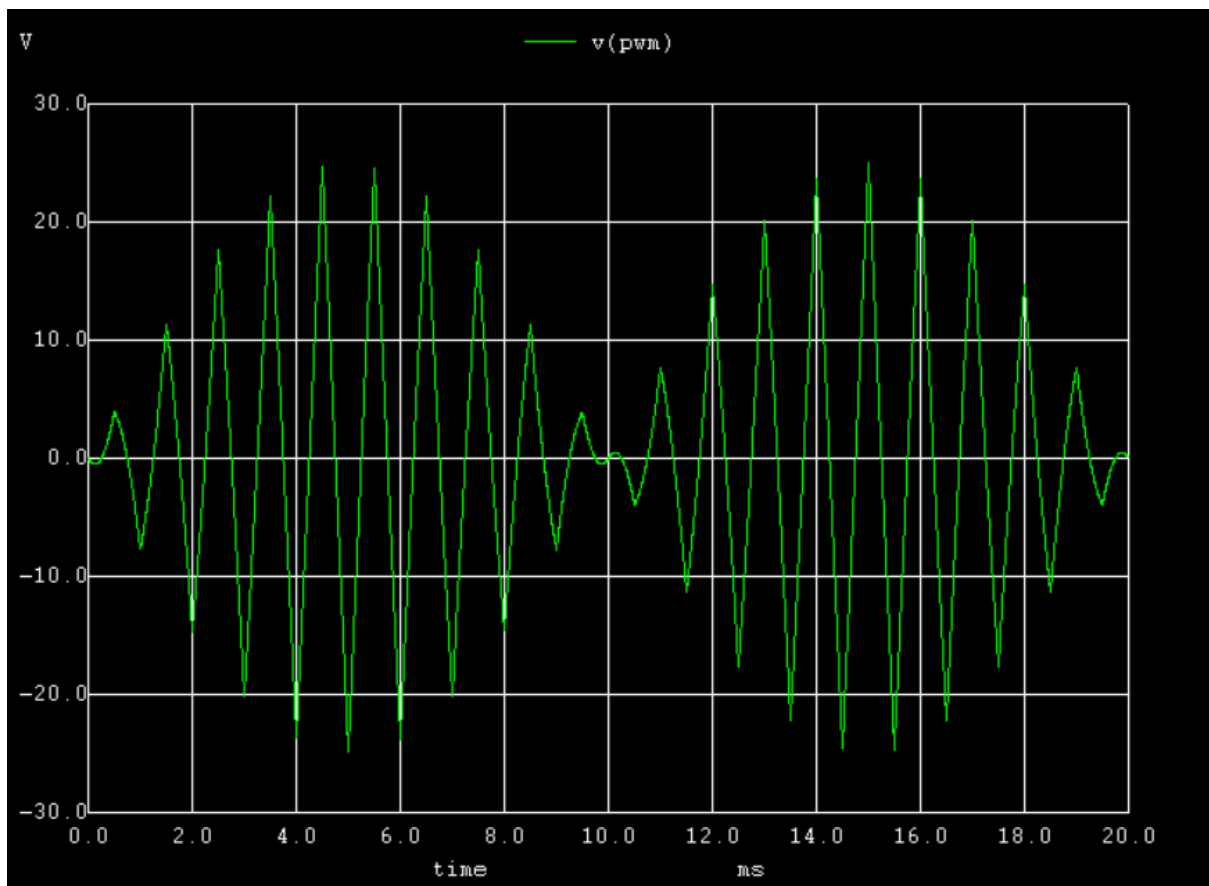
Add parameters for pulse source v2	
Enter initial value(Volts/Amps):	-5
Enter pulsed value(Volts/Amps):	5
Enter delay time (seconds):	0
Enter rise time (seconds):	0.5m
Enter fall time (seconds):	0.5m
Enter pulse width (seconds):	0.5u
Enter period (seconds):	1m

Results: NGSPICE waveforms

Input waveforms:

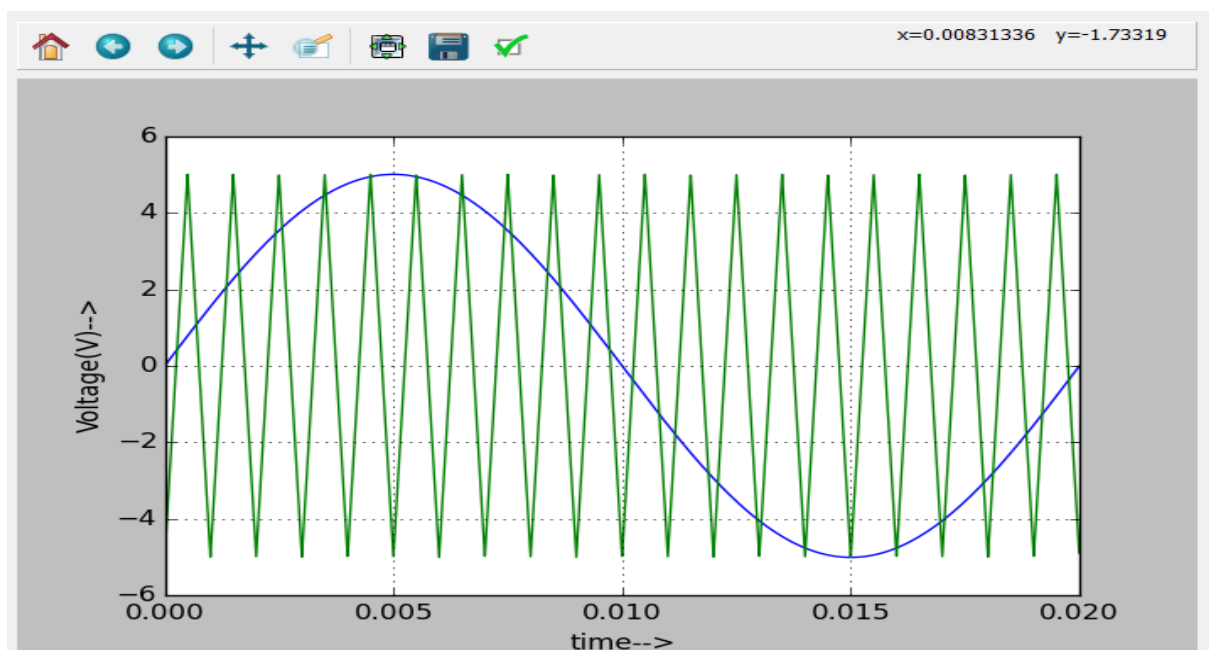


Output waveform:

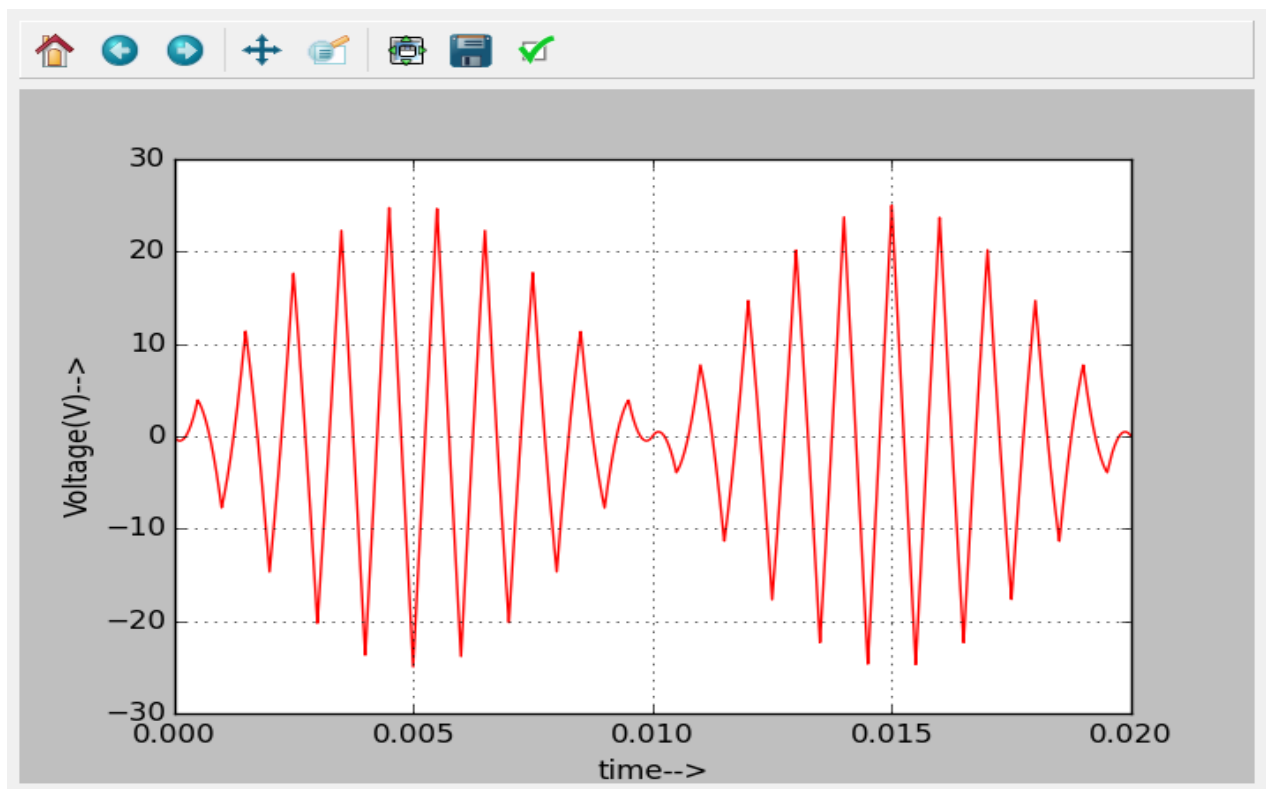


Python Plots:

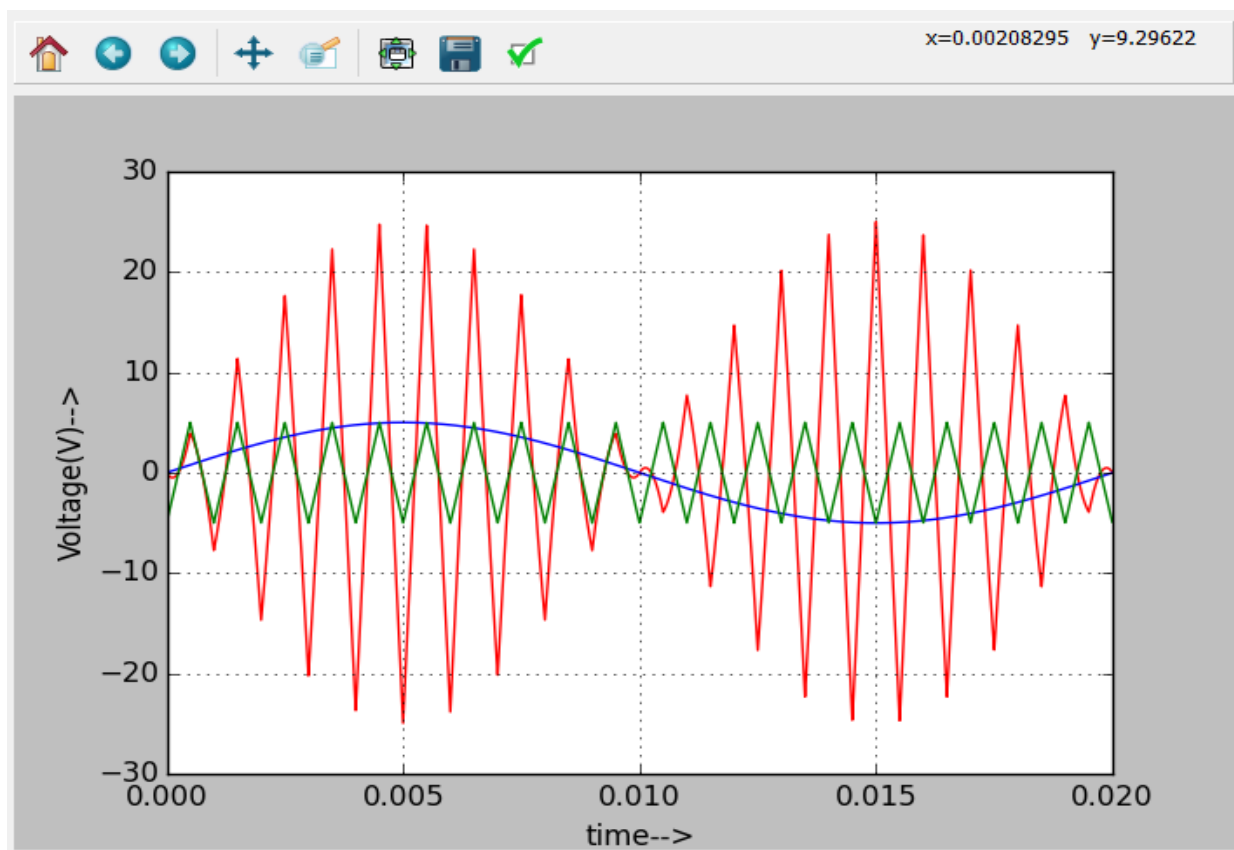
Input waveforms:



Output waveform:



Overall plots:



Source/References:

- **Title of paper:** Sine Wave Inverter Bipolar SPWM using Analog Triggering Circuit
- **Name of Journal:** International Journal of Engineering Research & Technology(IJERT)
- **Author:** Catur Rakhmad Handoko
- **Volume and Issue:** Volume 08, Issue 03 (March – 2019)
- **Link:** [Sine Wave Inverter Bipolar SPWM using Analog Triggering Circuit – IJERT](#)