

IMPLEMENTATION OF SERIES RESONANT CONVERTER IN MATLAB

Series resonant converter is used to get pure sinusoidal waveform in output from inverter.

Value of THD is very small which indicates the amplitude of harmonics present in output waveform is very small

Specifications:

- $THD \leq 5\%$
- $V_{o1} \text{ (RMS)} = 50V$ sinusoidal
- Resistive load (R) = 10Ω
- Freq = $1000Hz$

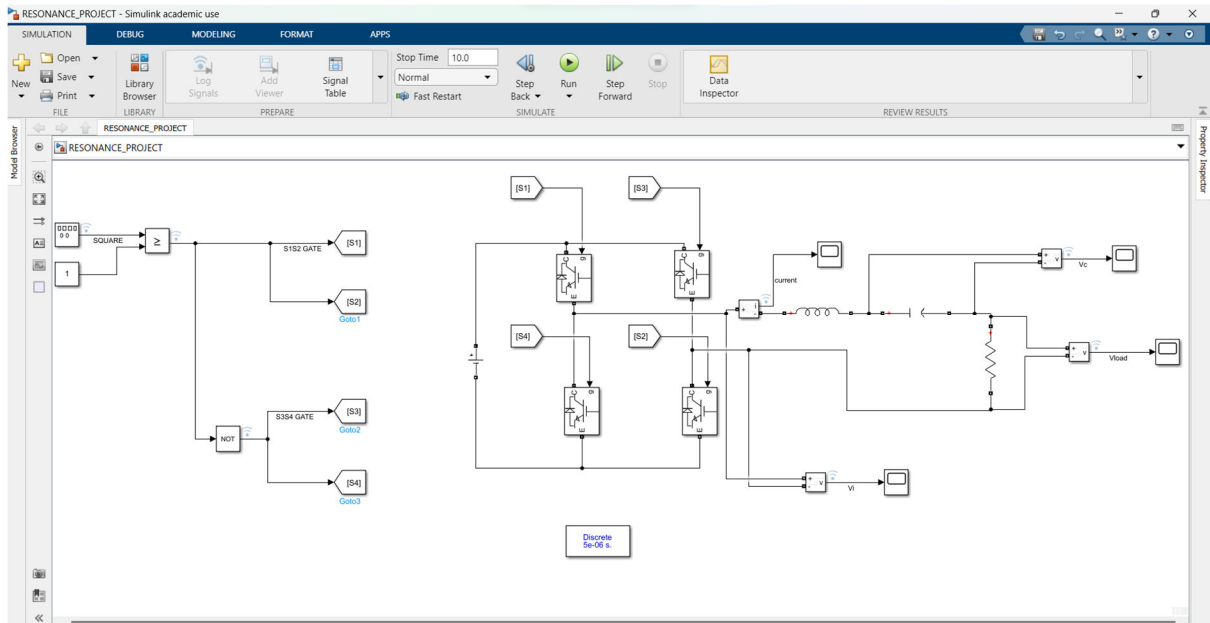
Assumptions involved in calculation:

- Neglect harmonics above 3rd harmonic to obtain THD less than 5%

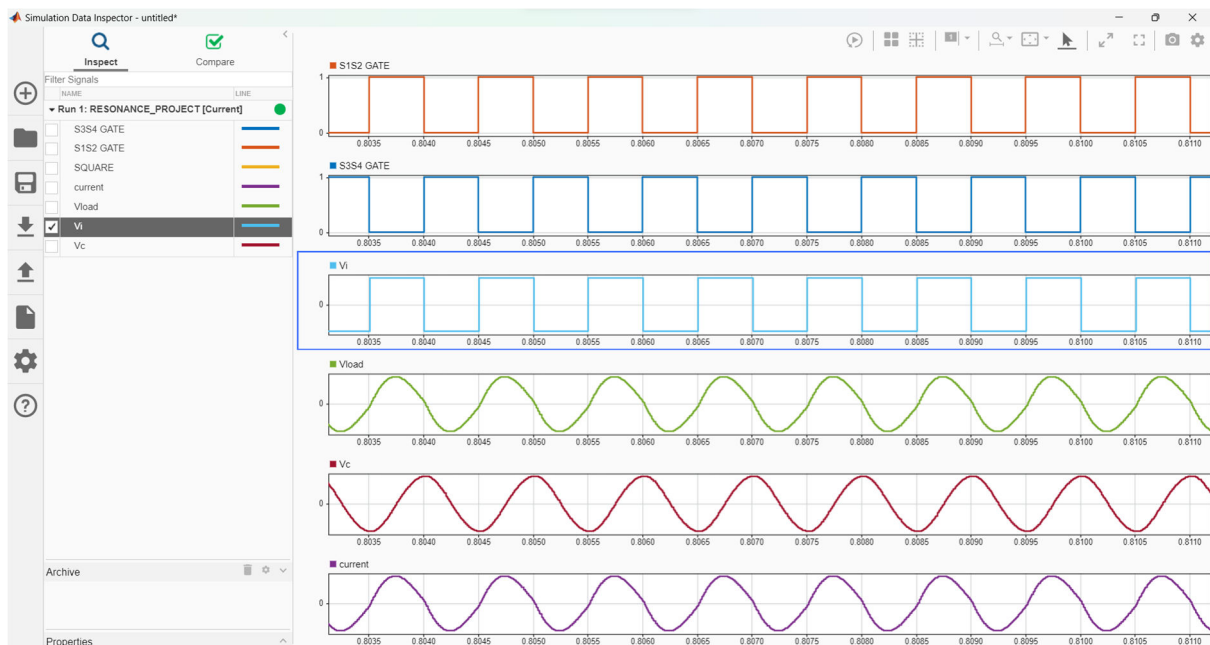
Calculations:

- The calculated values of inductance L_r & C_r are $3.93388mH$ & $6.439049\mu F$ respectively
- $V_{o1} = (4 * V_{dc}) / (\pi * \sqrt{2}) = 50V$
- $V_{dc} = 55.536V$
- $V_{o3} = 0.05 * V_{o1}$
- $V_{o3}/V_{i3} = R / \sqrt{R^2 + (3\omega L_r - 1/(3\omega C_r))^2}$
- $V_{i3} = (4 * V_{dc}) / (3 * \pi * \sqrt{2})$
- $\omega^2 L_r C_r = 1$

SIMULATION CIRCUIT

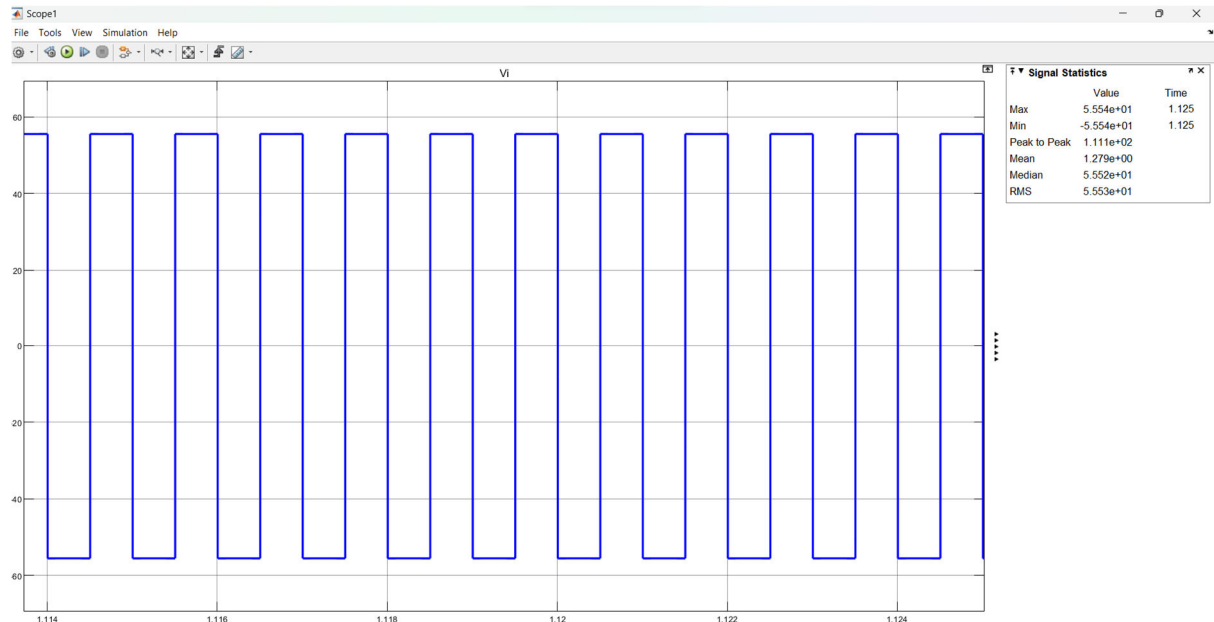


RESULTS

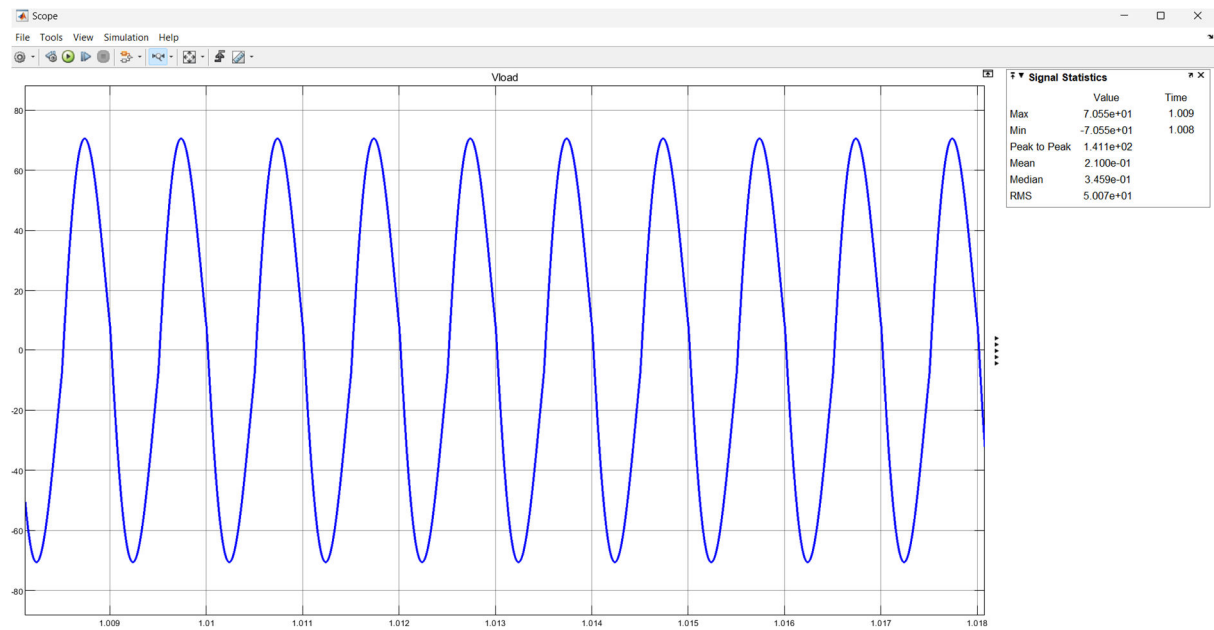


GRAPH

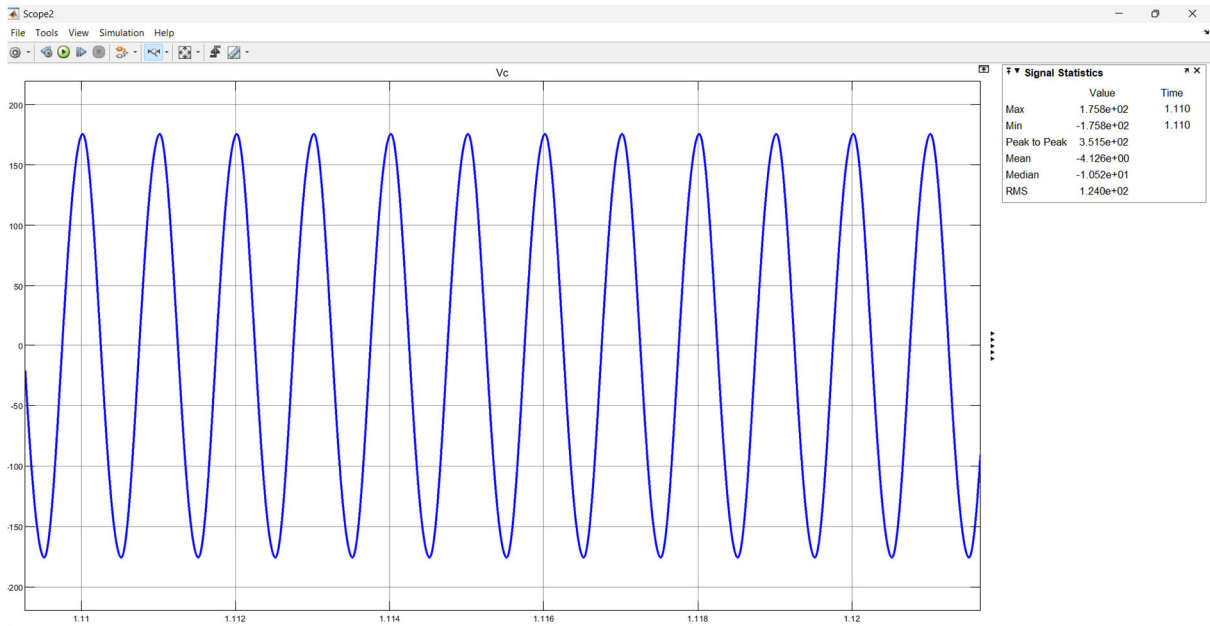
Vi (output of switch network)



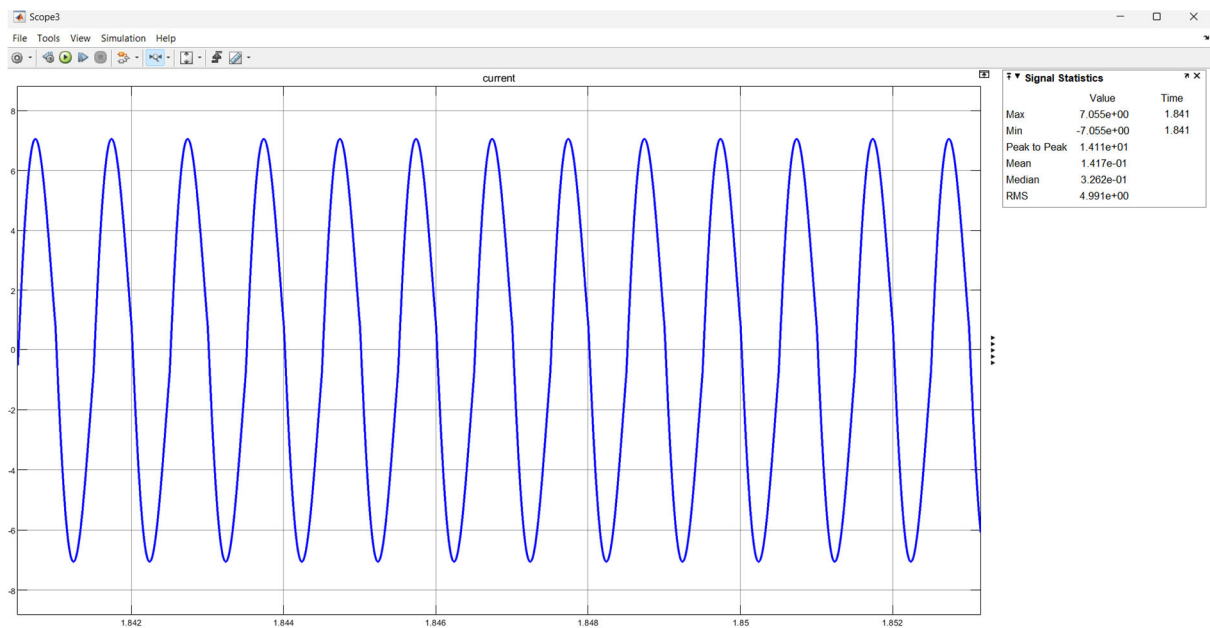
Vload (voltage across load)



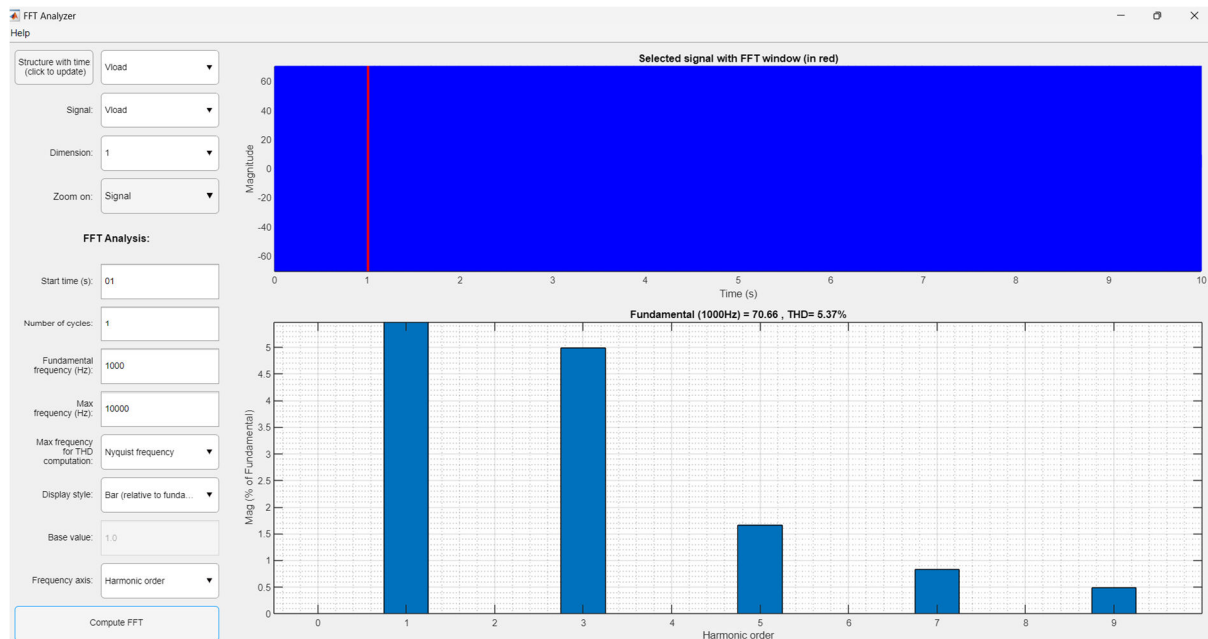
Vc (voltage across capacitor)



Current (current through inductor)



FFT with calculated values of Lr & Cr



THD:

- desired $\leq 5\%$
- obtained = 5.37%

The difference in THD is due to assumption made in calculation of Lr & Cr.

To obtain desired THD=5%, value of Lr & Cr should be 4.23mH & 5.988 μ F respectively

For Lr \geq 4.23mH & corresponding value of Cr, we can get desired THD \leq 5%

FFT with Lr & Cr values to obtain desired THD=5%

