EXPERIMENT 6

Name -
Mehul Kavdia (2018A8PS0860P)
Yash Raj Agarwal (2018A8PS0782P)
Jash Shah (2018A8PS0507P)
Pranamya Jain (2018A8PS0769P)
Jaskaran Singh (2018A8PS0806P)

Sec No. - 4 **Group No.** - 10
Date - 25/03/21

Objective - Study of 3 phase controlled and uncontrolled rectifier circuits

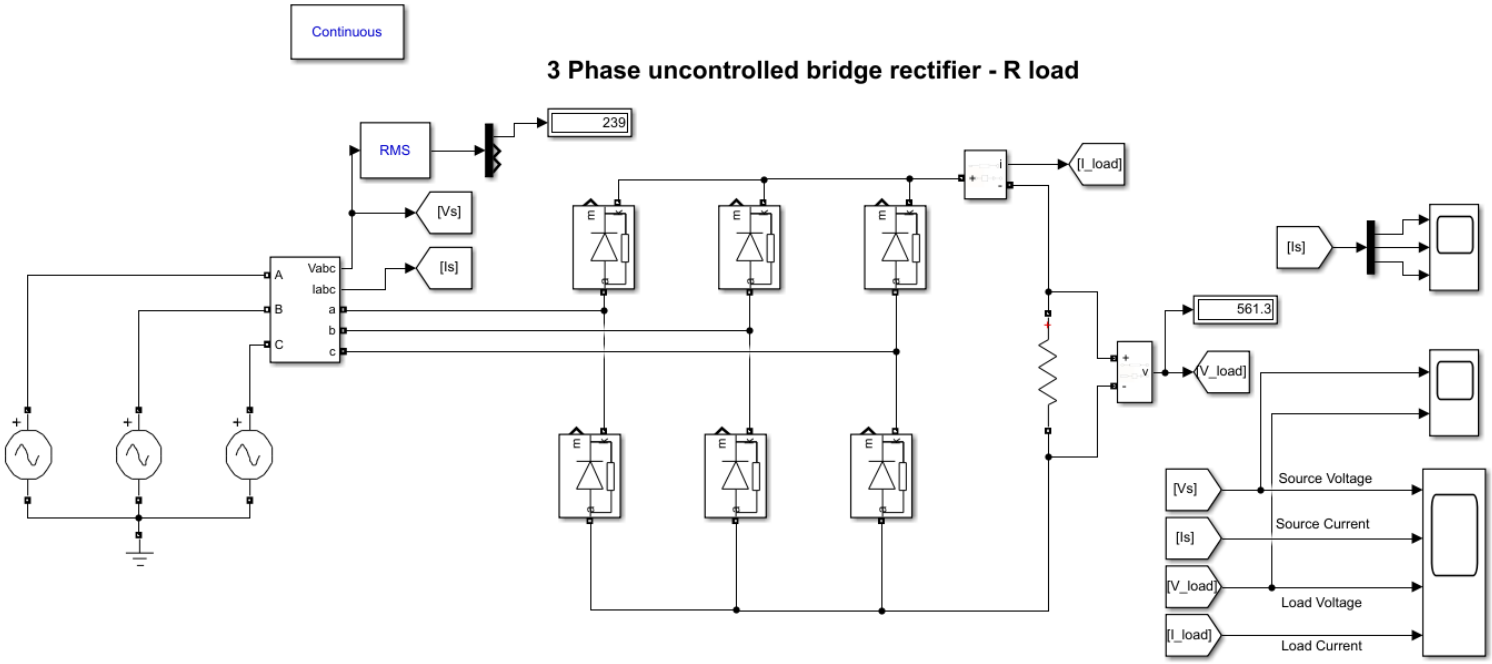
Software tool: MATLAB Simulink, Simscape toolbox (power GUI)

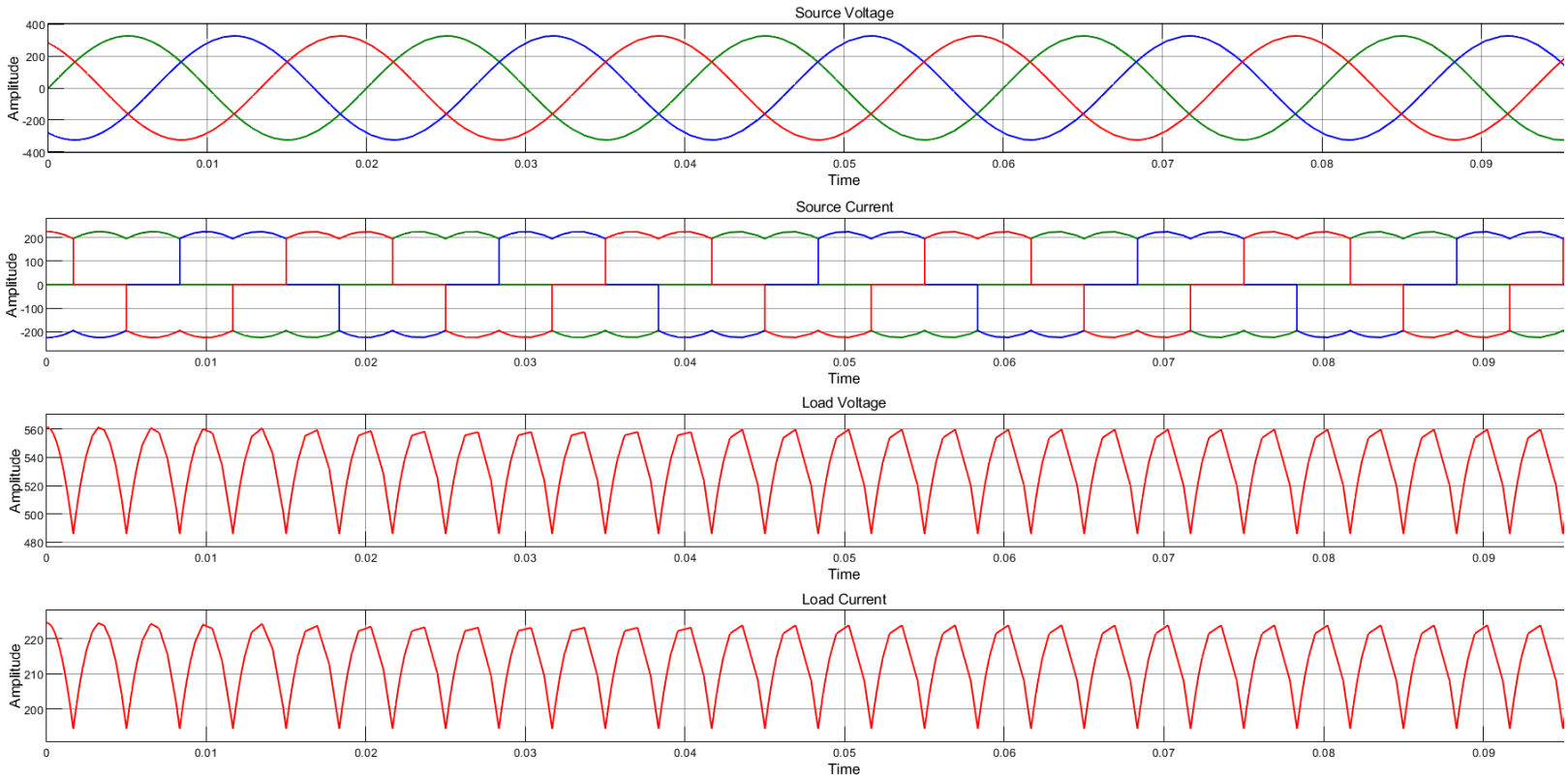
Components used:

Diode, thyristor; AC source; Resistor, inductor; Voltage and current sensors; Display; Scope

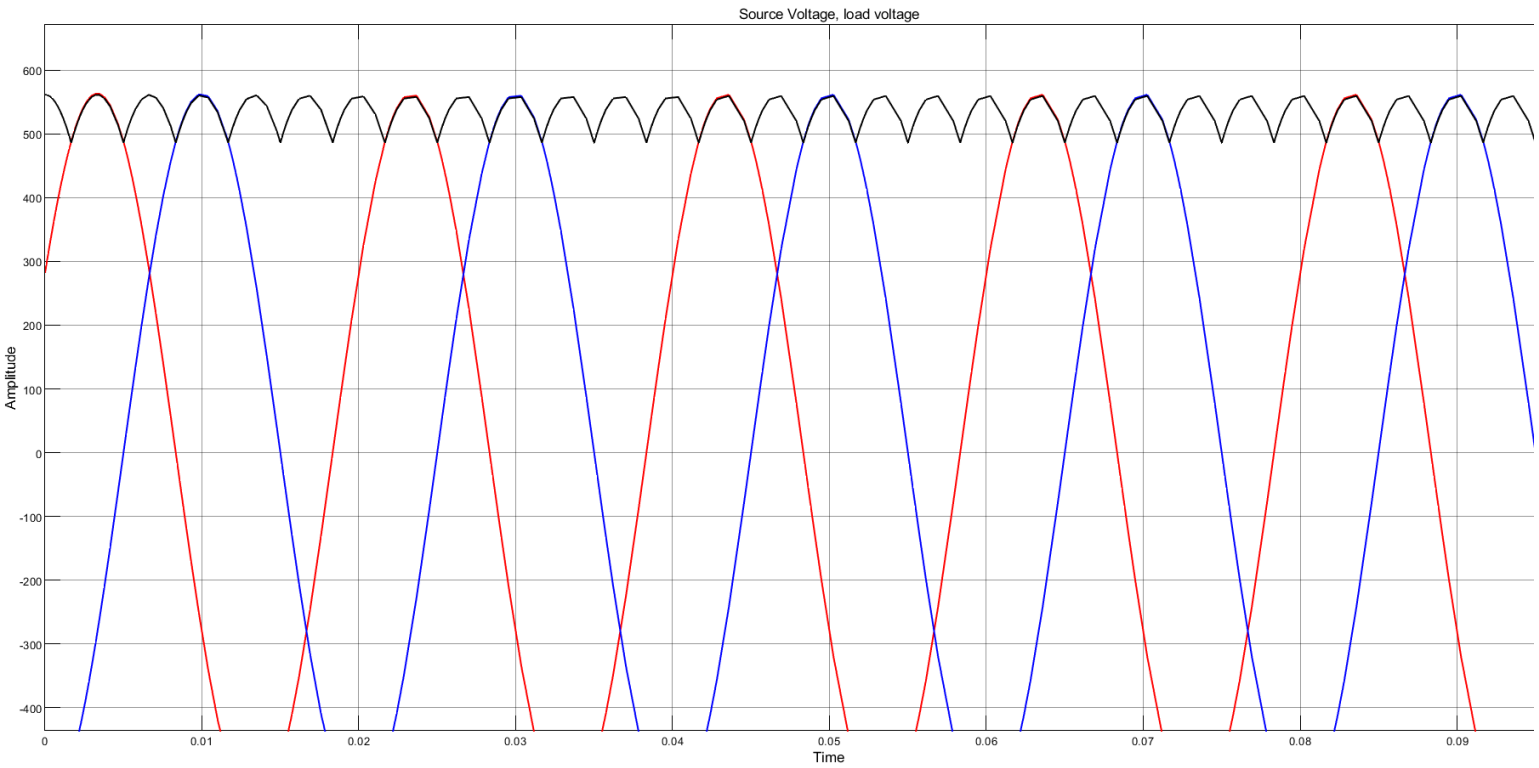
1.1 Three phase uncontrolled bridge rectifier - R load(2.5 ohms)

Software Tool: MATLAB Simulink, Sim Power System toolbox
AC input: Vs RMS = 230 V AC frequency: 50Hz
R = 2.5Ohms

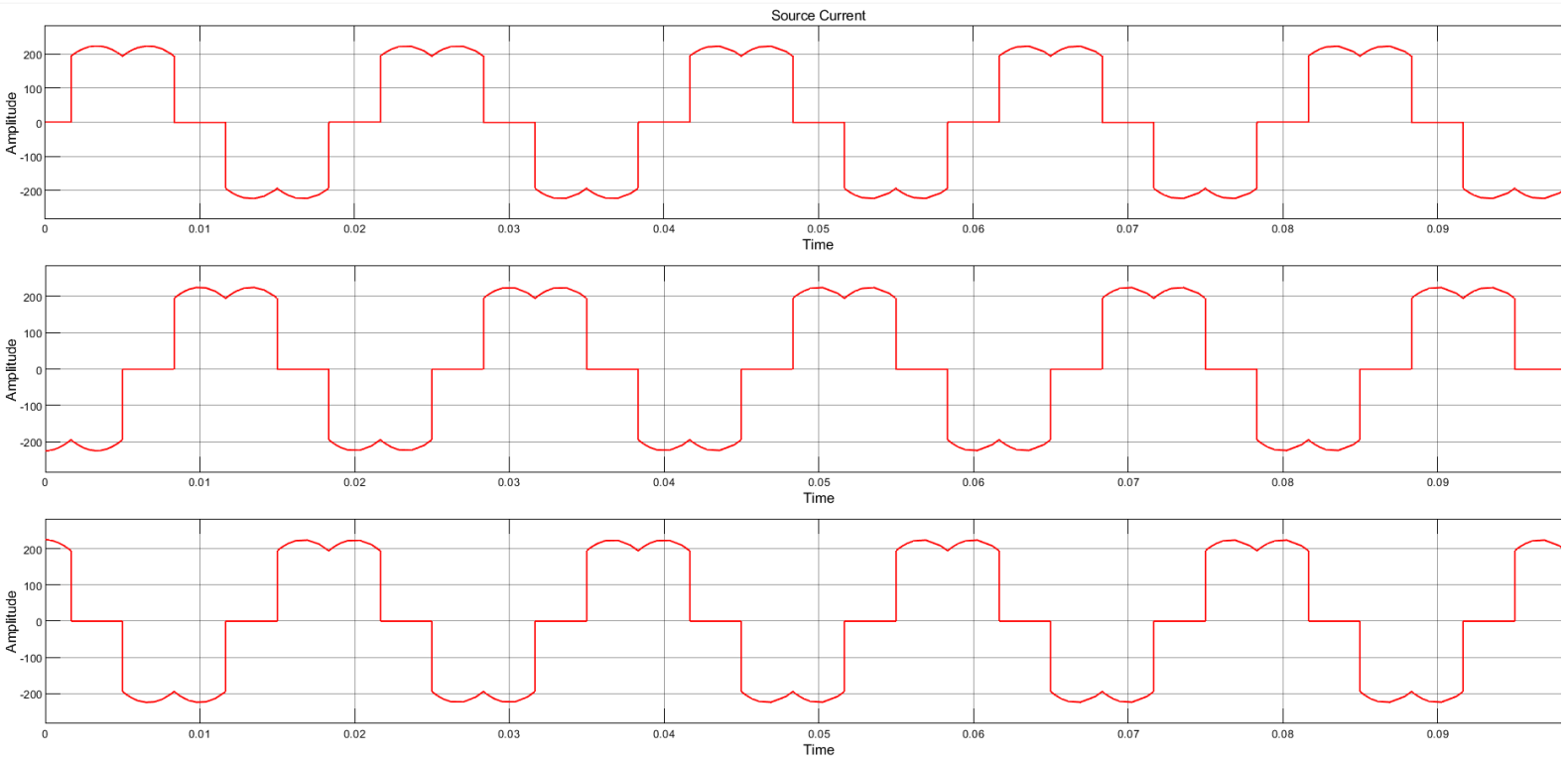




Source voltage, Source current, Load Voltage, Load current



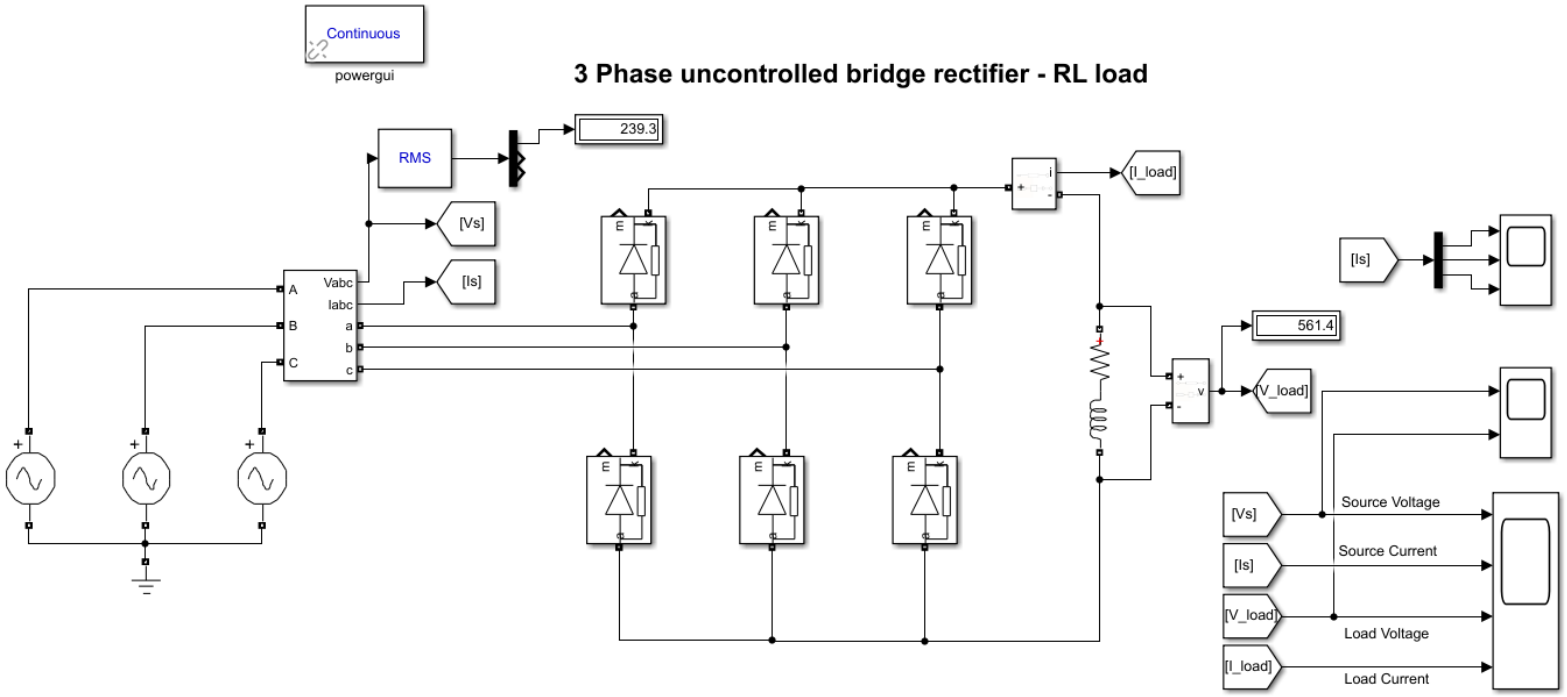
Source voltage, Load Voltage(phase to phase)

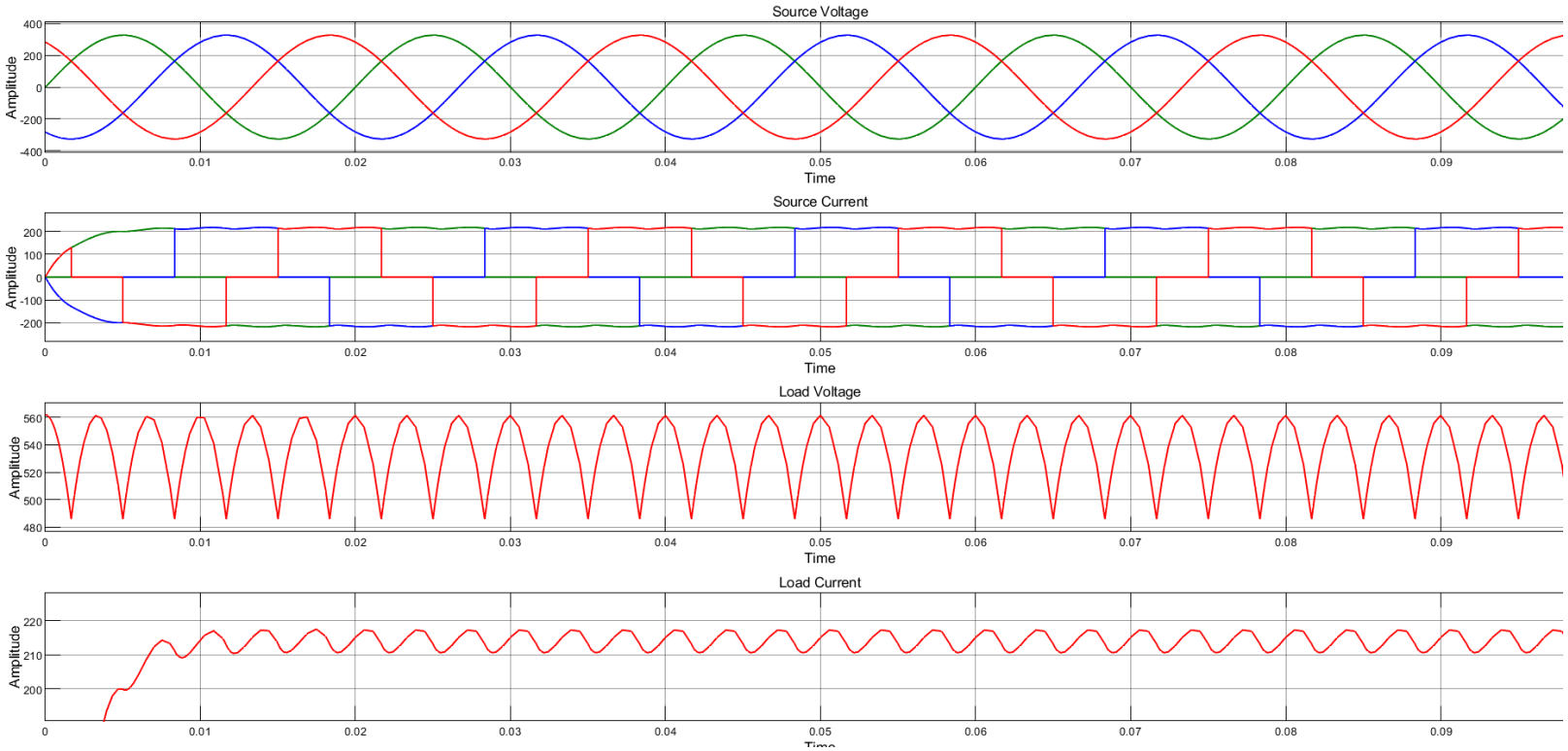


Source Current

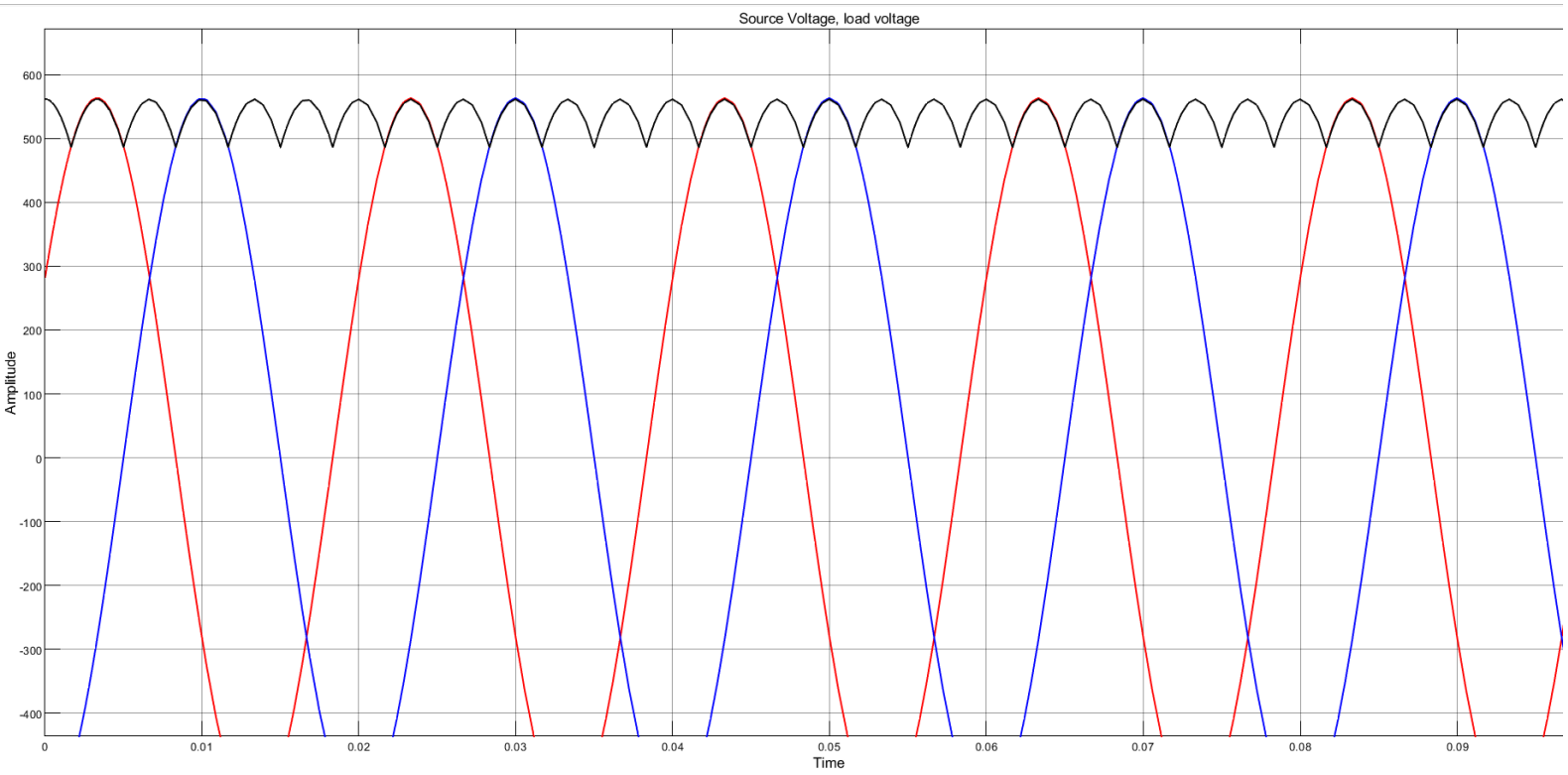
1.2 Three phase uncontrolled bridge rectifier - RL load(2.5 ohms, 4.5mH)

Software Tool: MATLAB Simulink, Sim Power System toolbox
AC input: Vs RMS = 230 V AC frequency: 50Hz
R = 2.5Ohms, L=4.5mH

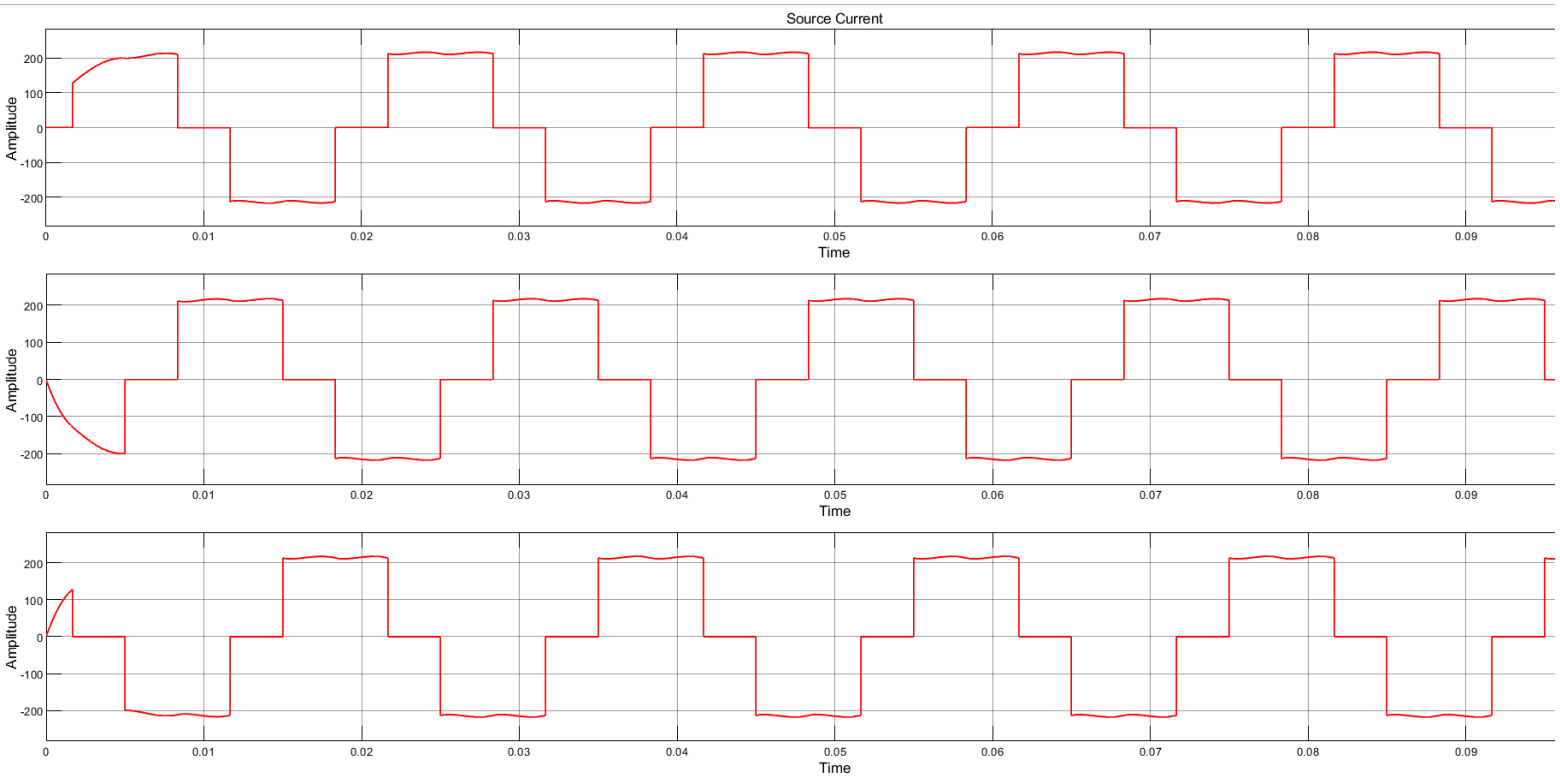




Source voltage, Source current, Load Voltage, Load current



Source voltage, Load Voltage(phase to phase)

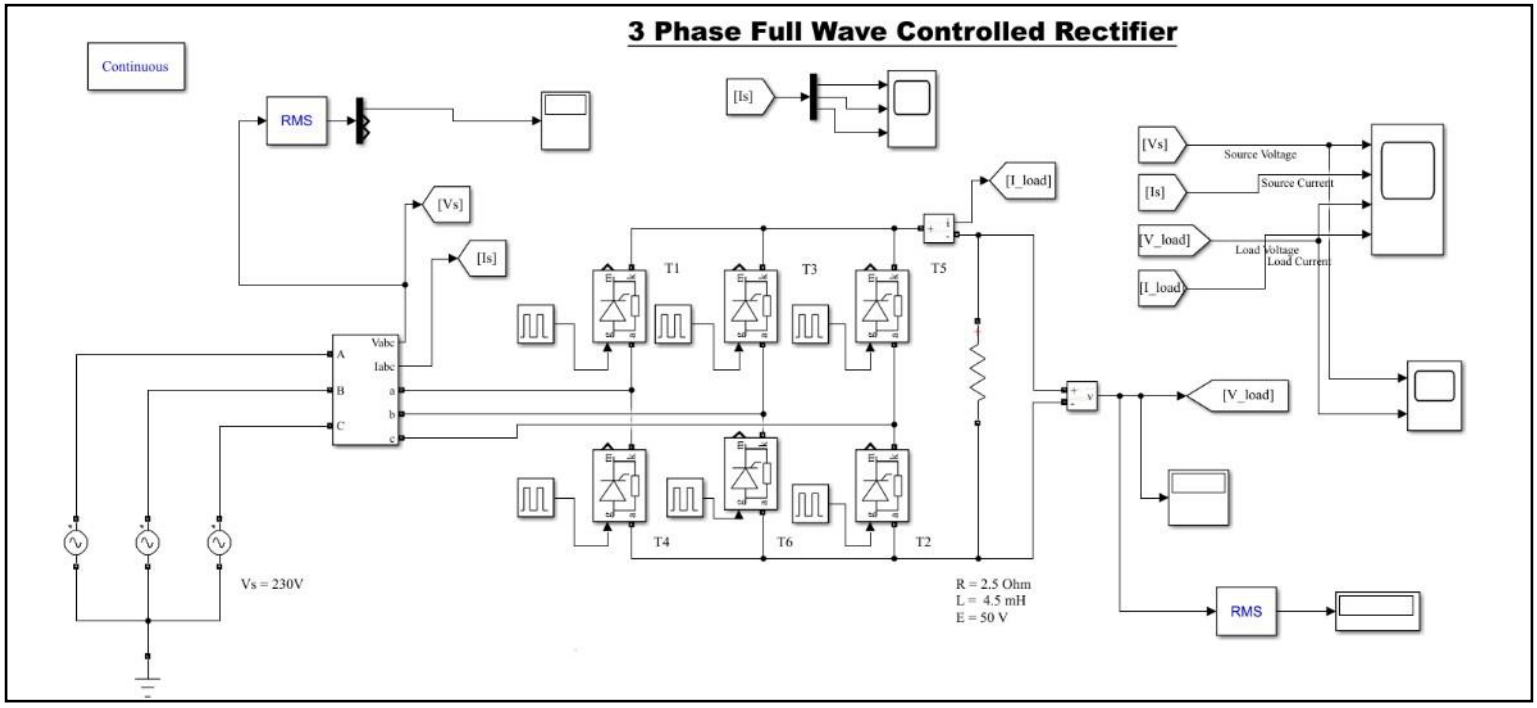


Source Current

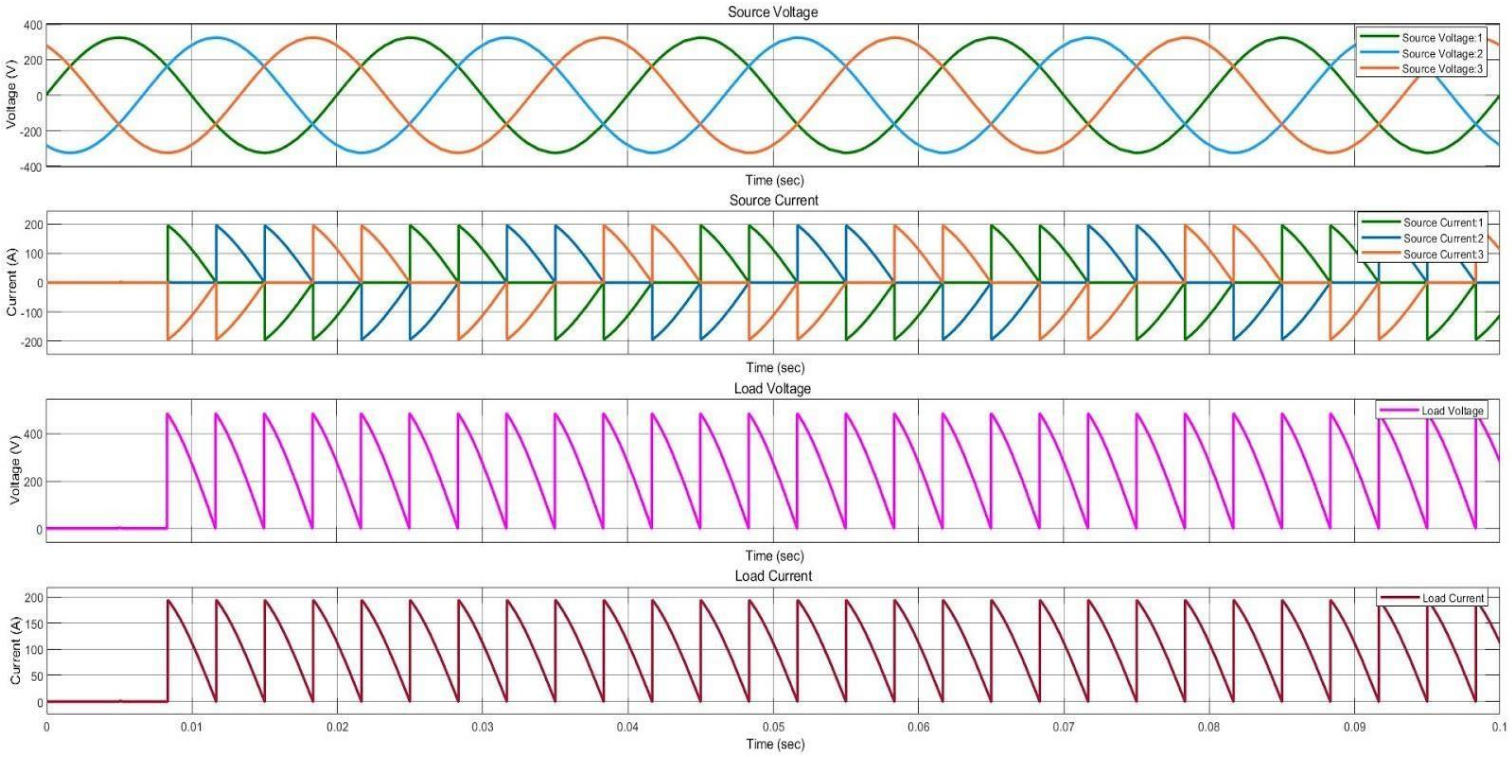
1.3 Calculations

Load	R	RL
Avg output voltage	534.8	535
RMS output voltage	535.4	536
Ripple voltage	23.13	23.14
Voltage ripple factor	0.0432	0.043228
Rectification efficiency	0.998	0.99
Peak inverse voltage	280.5	280.5
Form factor	1.001	1.001

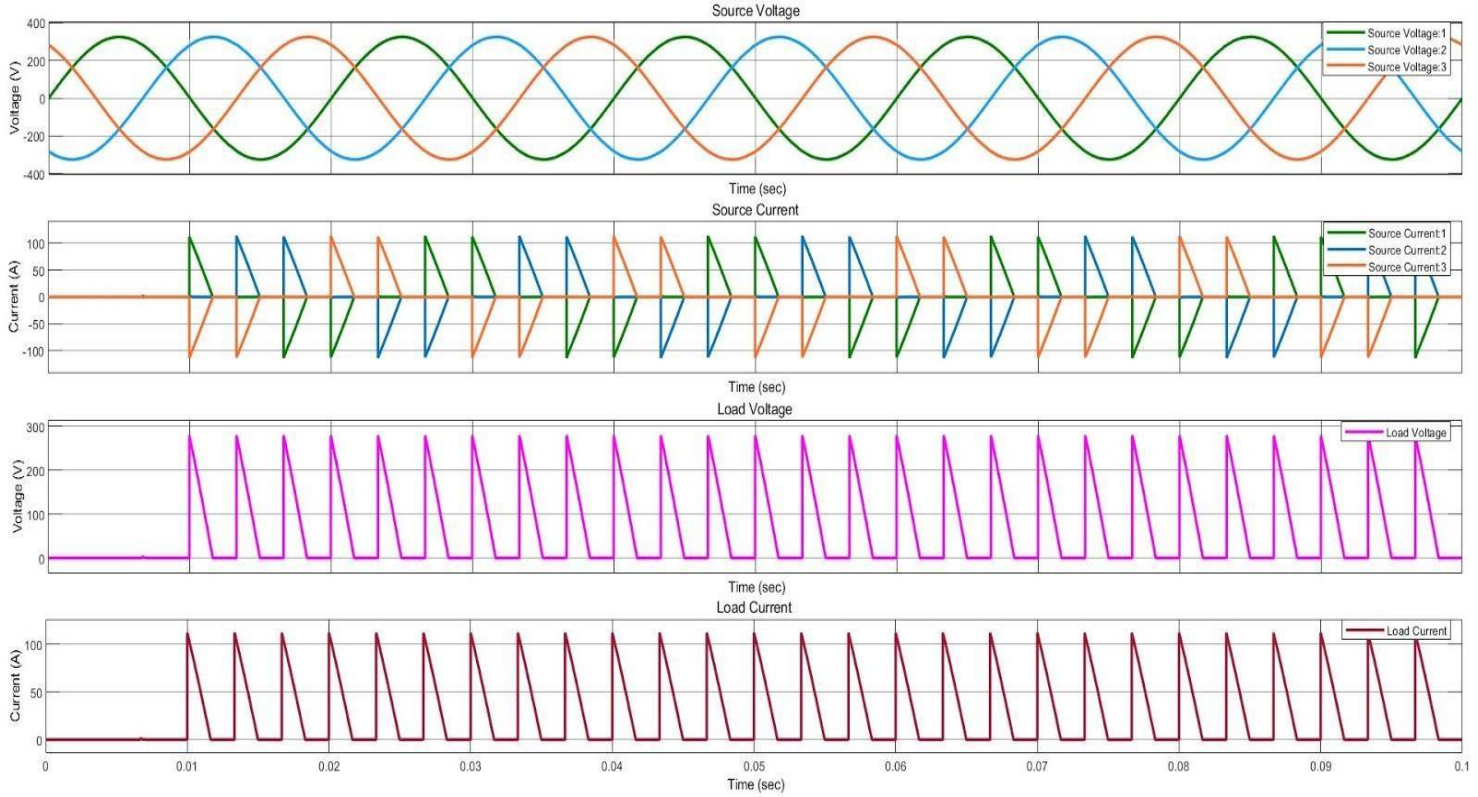
2. Three phase full controlled bridge rectifier



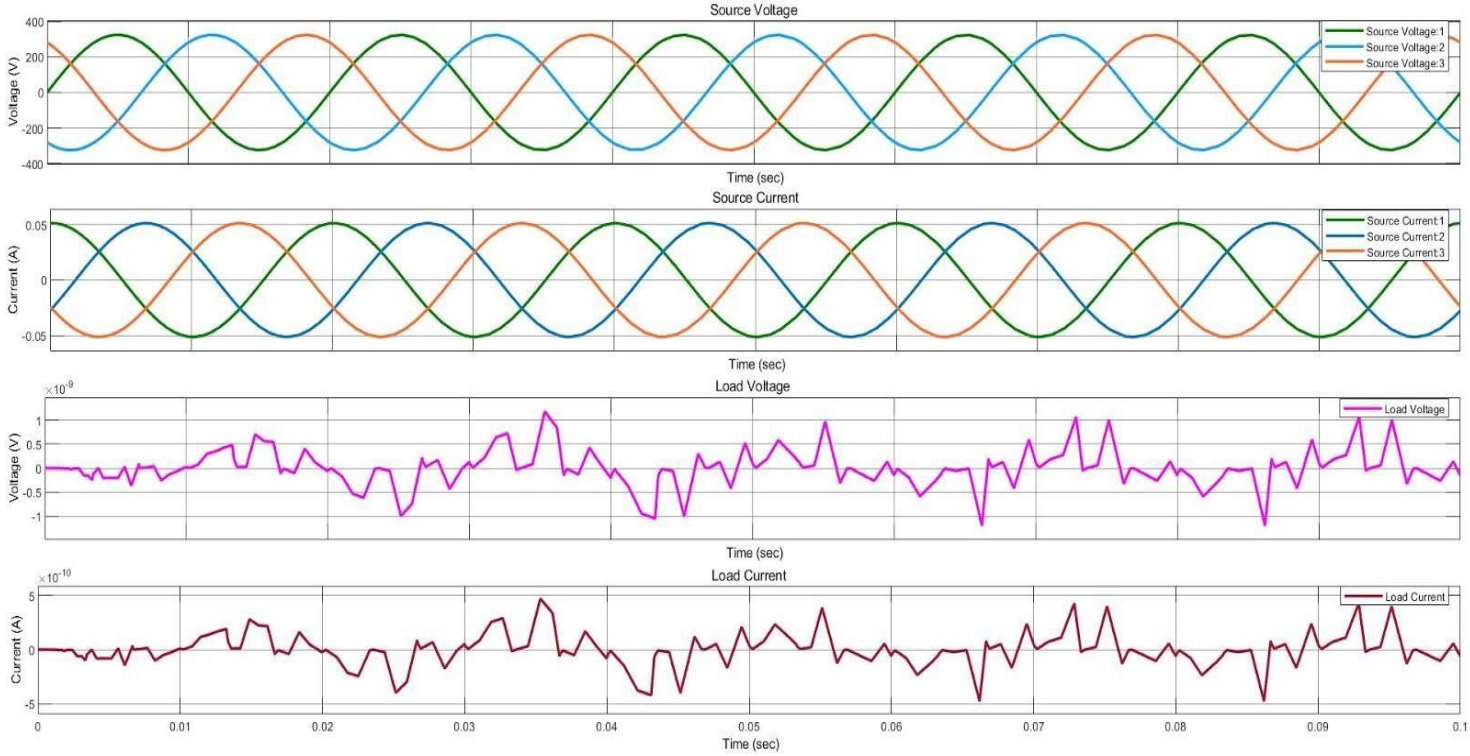
2.1 R load(2.5 ohms) , α=60°.



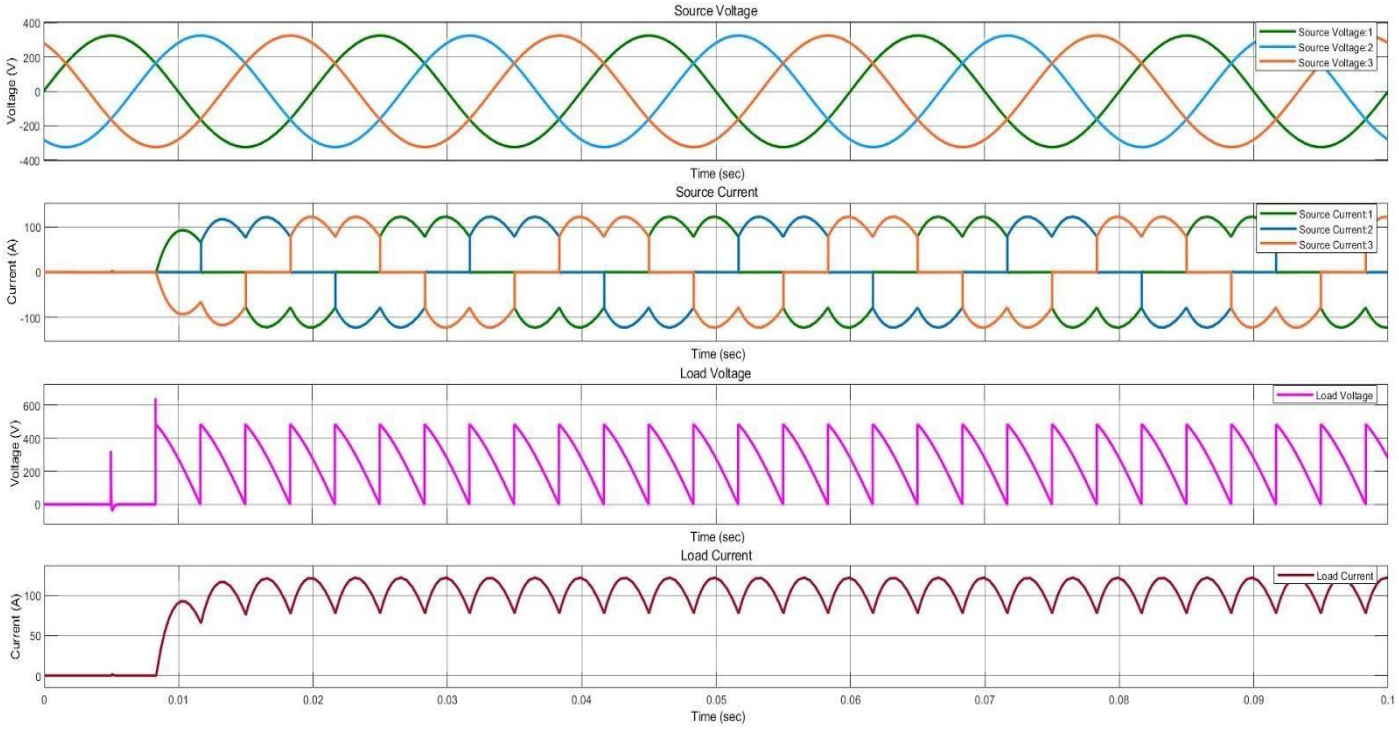
2.2 R load(2.5 ohms) , α=90°



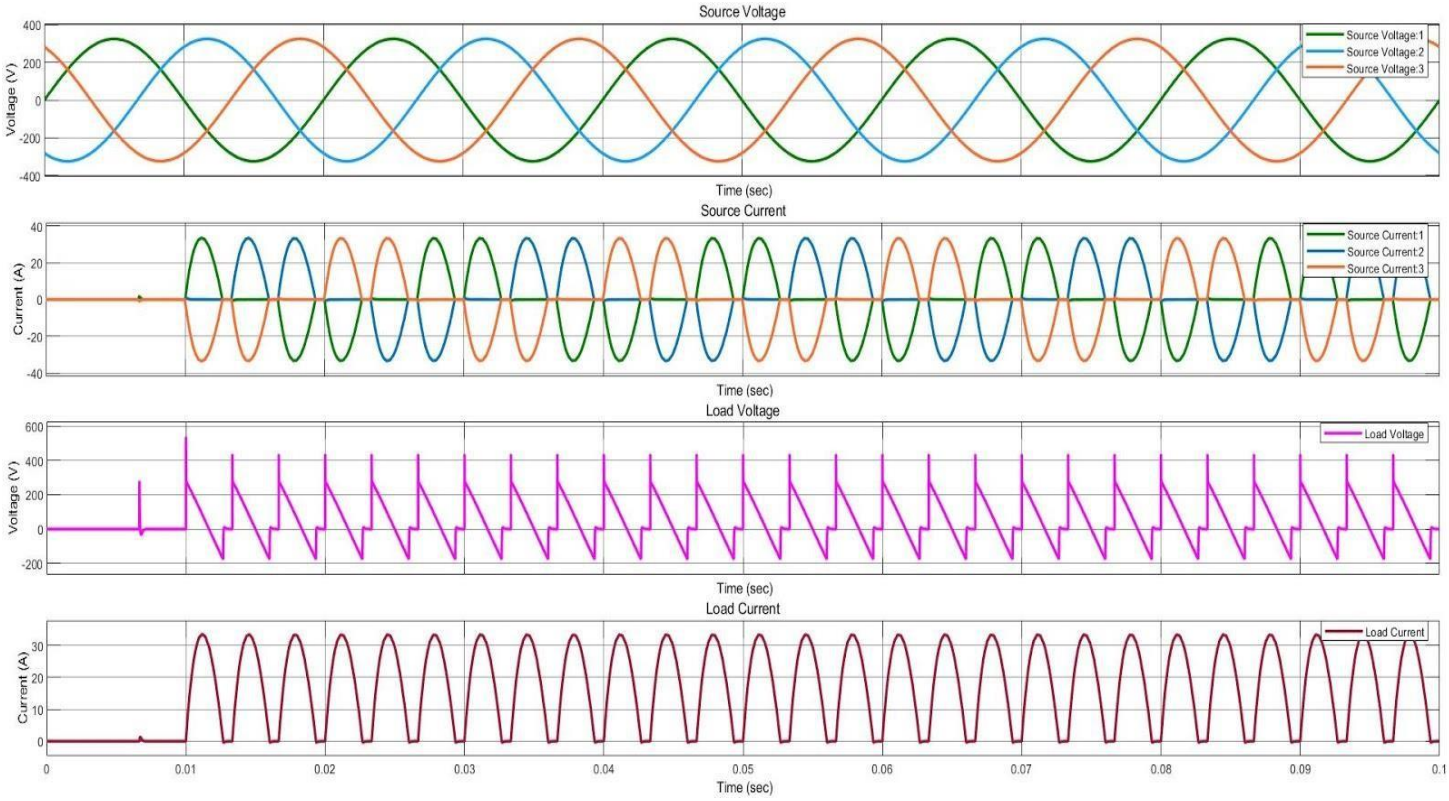
2.3 R load(2.5 ohms) , α=150°



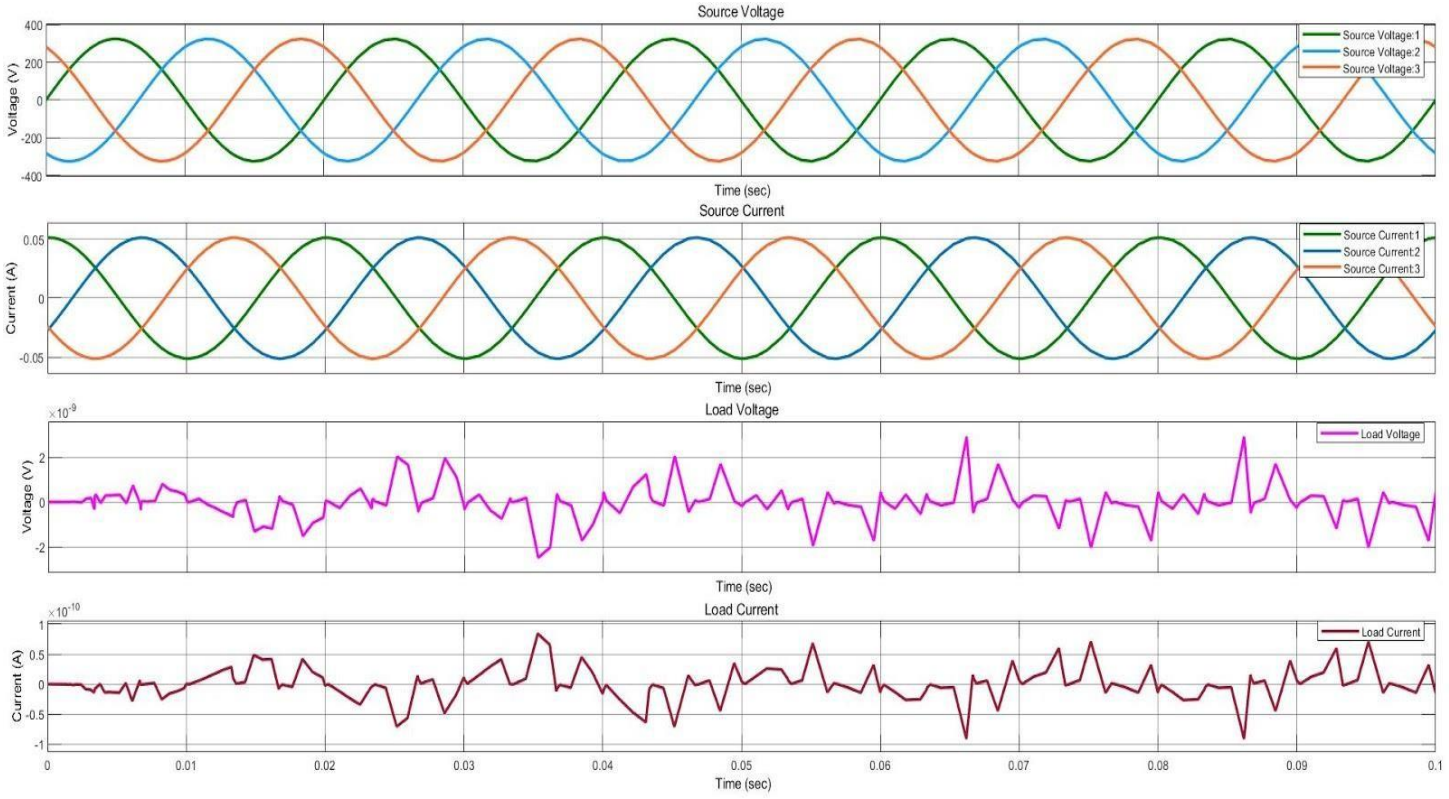
2.4 RL load(2.5 ohms) , α=60°



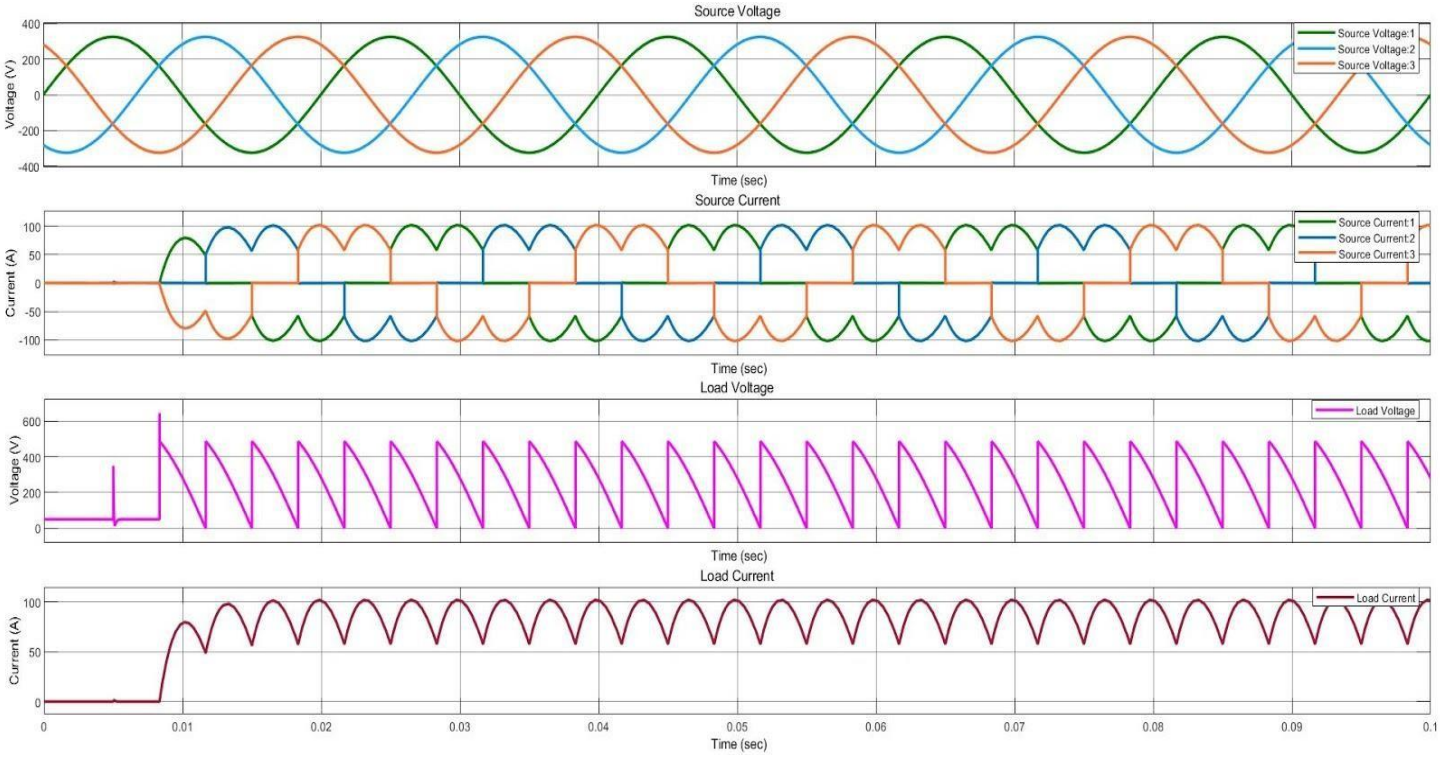
2.5 RL load, α=90°



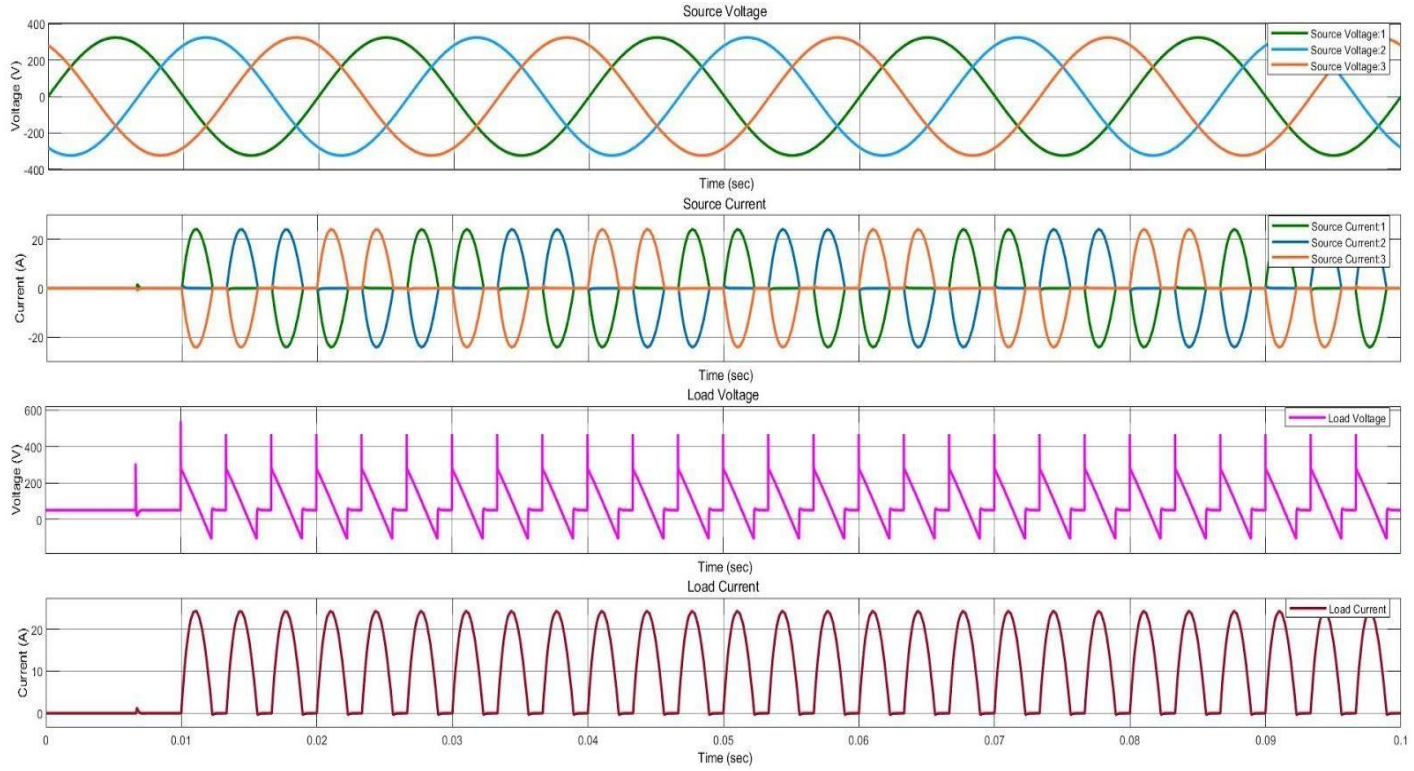
2.6 RL load, α=150°



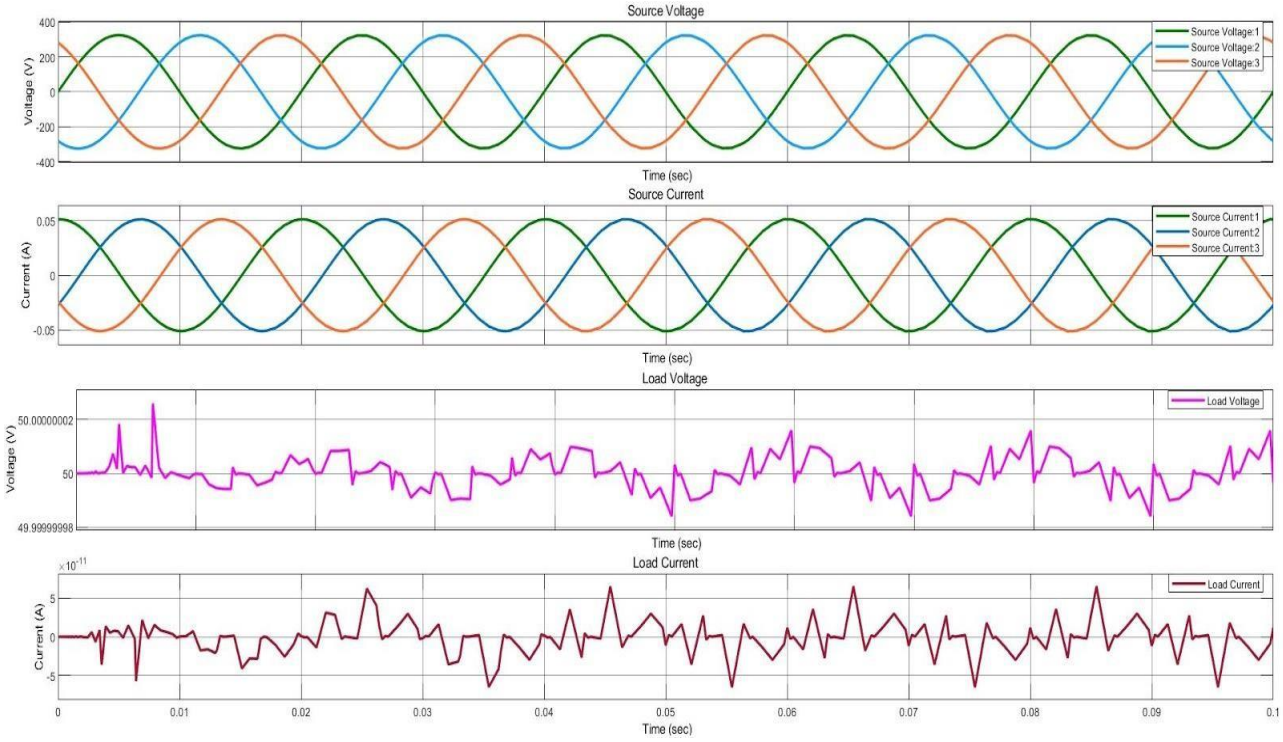
2.7 RLE load, α=60°



2.8 RLE load, α=90°



2.9 RLE load, α=150°



2.10 Calculations

Load		**R**			**RL**			**RLE**	
	60°	**90°**	**150°**	**60°**	**90°**	**150°**	**60°**	**90°**	**150°**
Avg output voltage	267.4	71.22	5.4e-12	267.2	44.36	-8.14e-13	267.3	77.54	50
RMS output voltage	305.2	116.6	5.43e-7	304.0	130.6	7.3e-5	303.9	124.2	50
Ripple voltage	147.12	92.32	5.43e-7	144.98	122.83	7.3e-5	144.58	97.02	0
Voltage ripple factor	0.55	1.296	1e+5	0.542	2.77	9e+7	0.54	1.251	0
Rectification efficiency	0.802	0.231	0	0.708	0.193	0	0.71	0.31	0
Peak inverse voltage	280.8	162.4	1.82e-6	280.8	156.4	3.134e-7	280.8	135.8	25
Form factor	1.141	1.637	1e+5	1.137	2.9441	9e+7	1.137	1.6	1