EXPERIMENT 5

Name -

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Objective - Study of Effect of Filter on Distortions of Rectifying circuits

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

Components used:

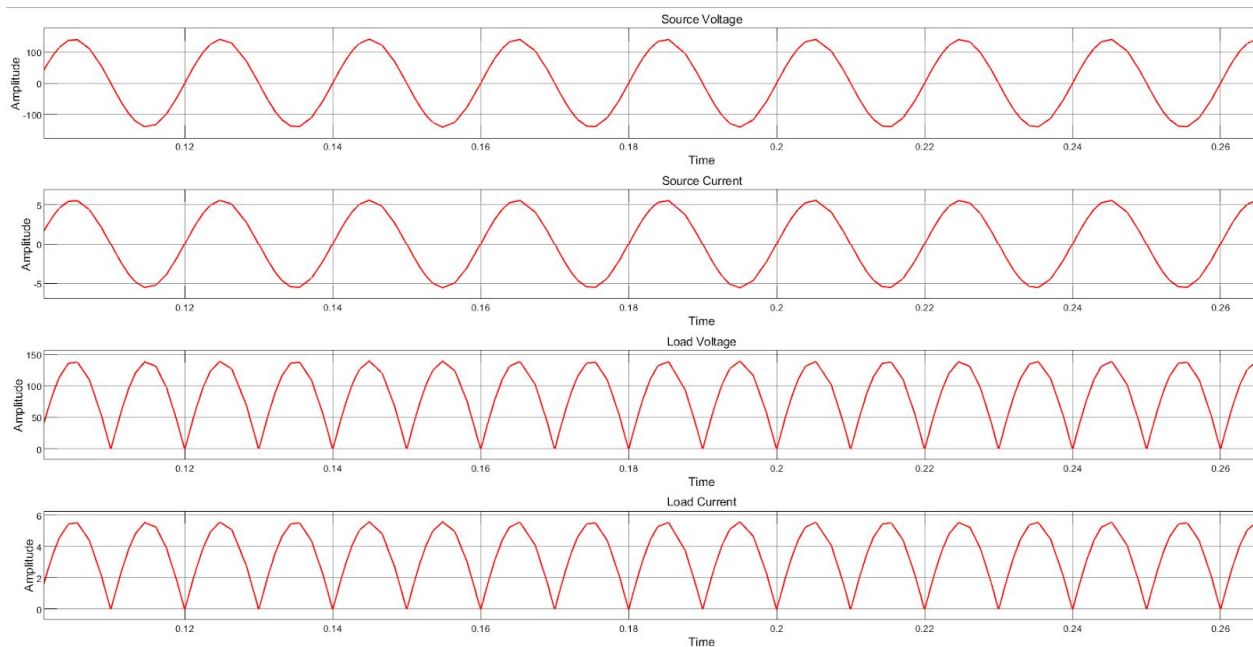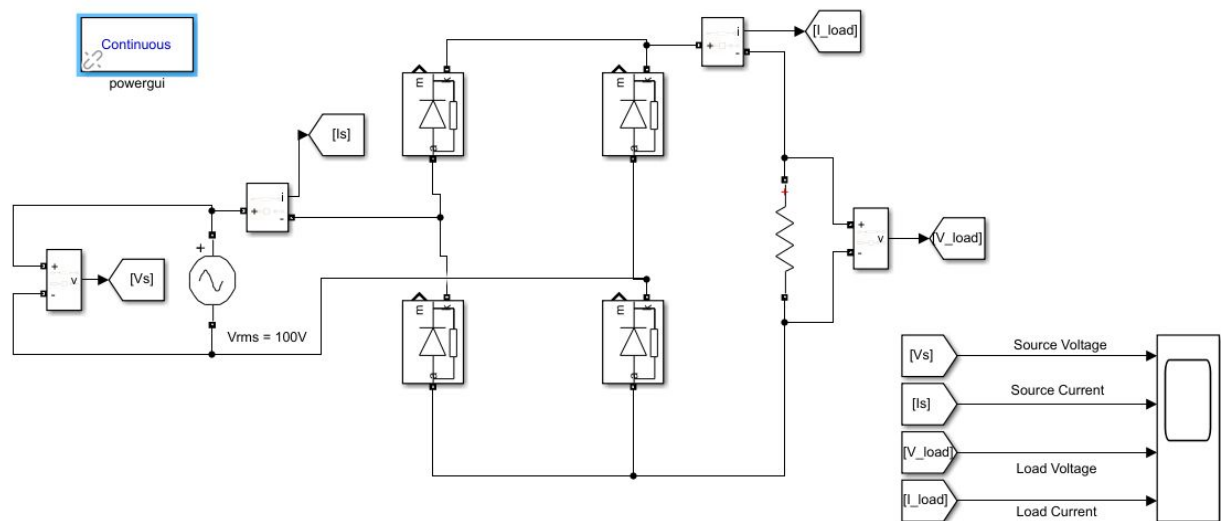Diode; AC source; Resistor, inductor, capacitor; Voltage and current sensors; Display; Scope

1. Single phase full wave uncontrolled rectifier - R load(25 ohms)

Software Tool: MATLAB Simulink, Sim Power System toolbox
AC input: Vs RMS = 100 V AC frequency: 50Hz
R = 25Ohm C = 100uF L = 5mH, 50mH

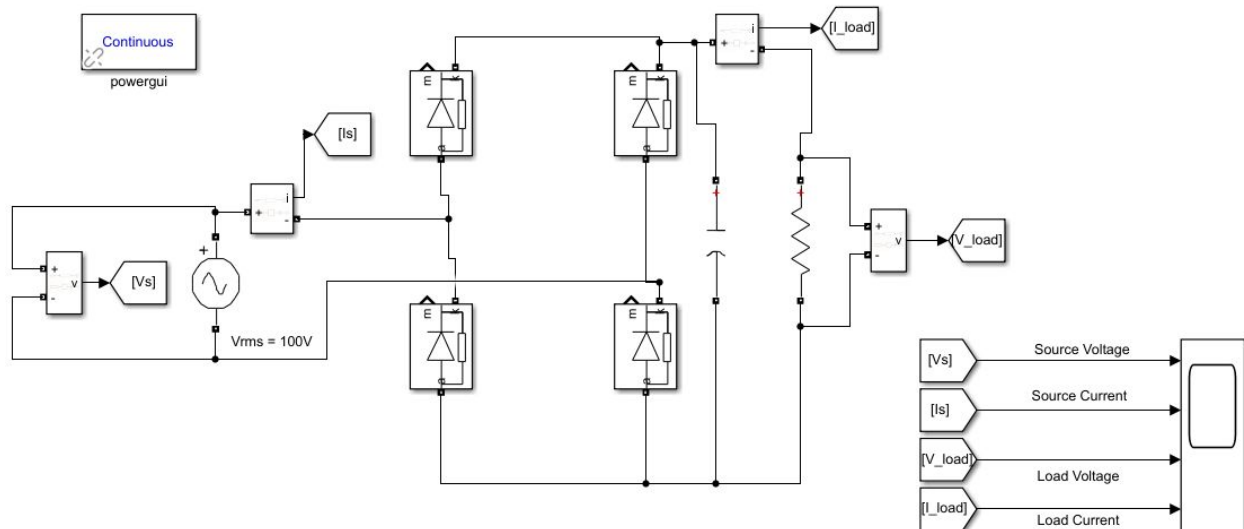**1-phase fullwave uncontrolled rectifier - R load**
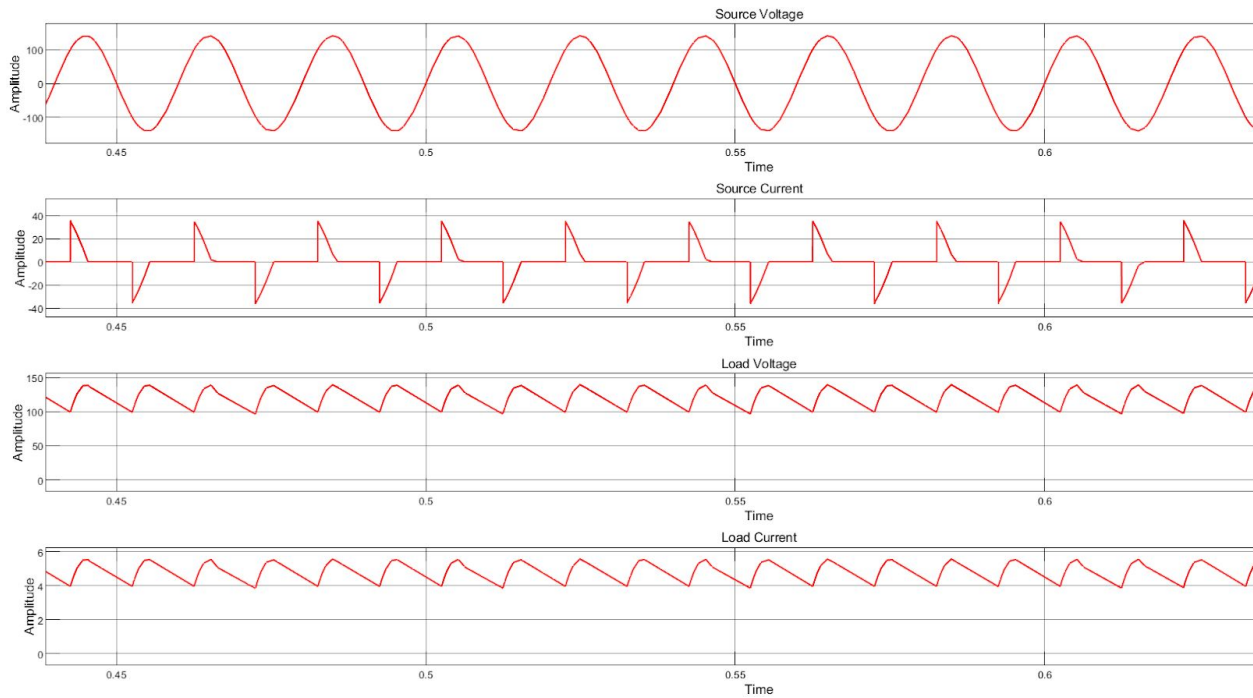
Unfiltered THD:
Source Voltage : 2.84%
Source Current : 3.29%
Load Voltage : 2146.54%
Load Current : 2146.54%

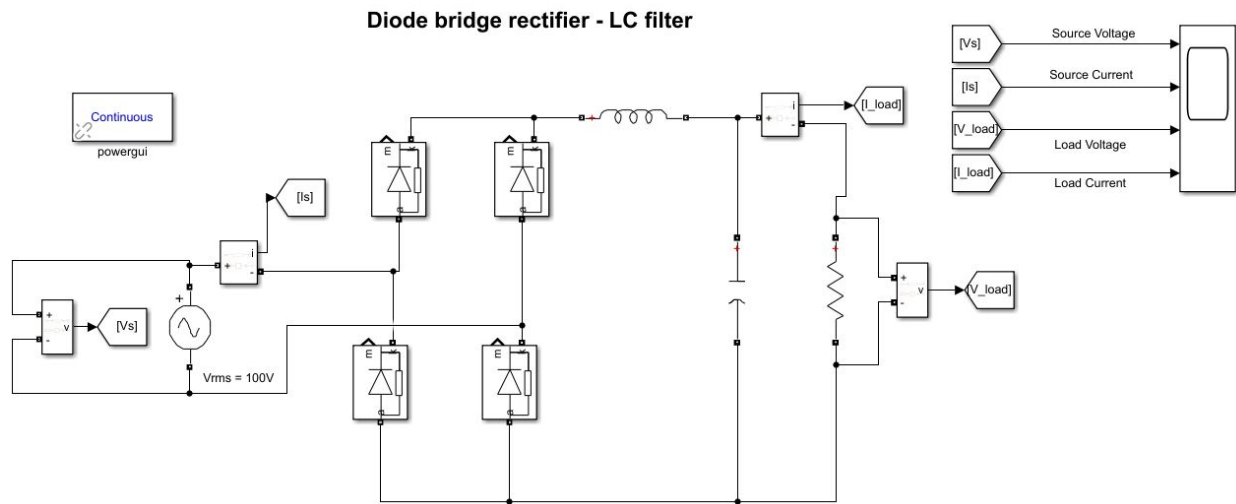## 2. Diode bridge rectifier with C filter and R load(25 ohms, 1000uF)

THD For C Filter:
Source Voltage : 0.75%
Source Current : 86.99%
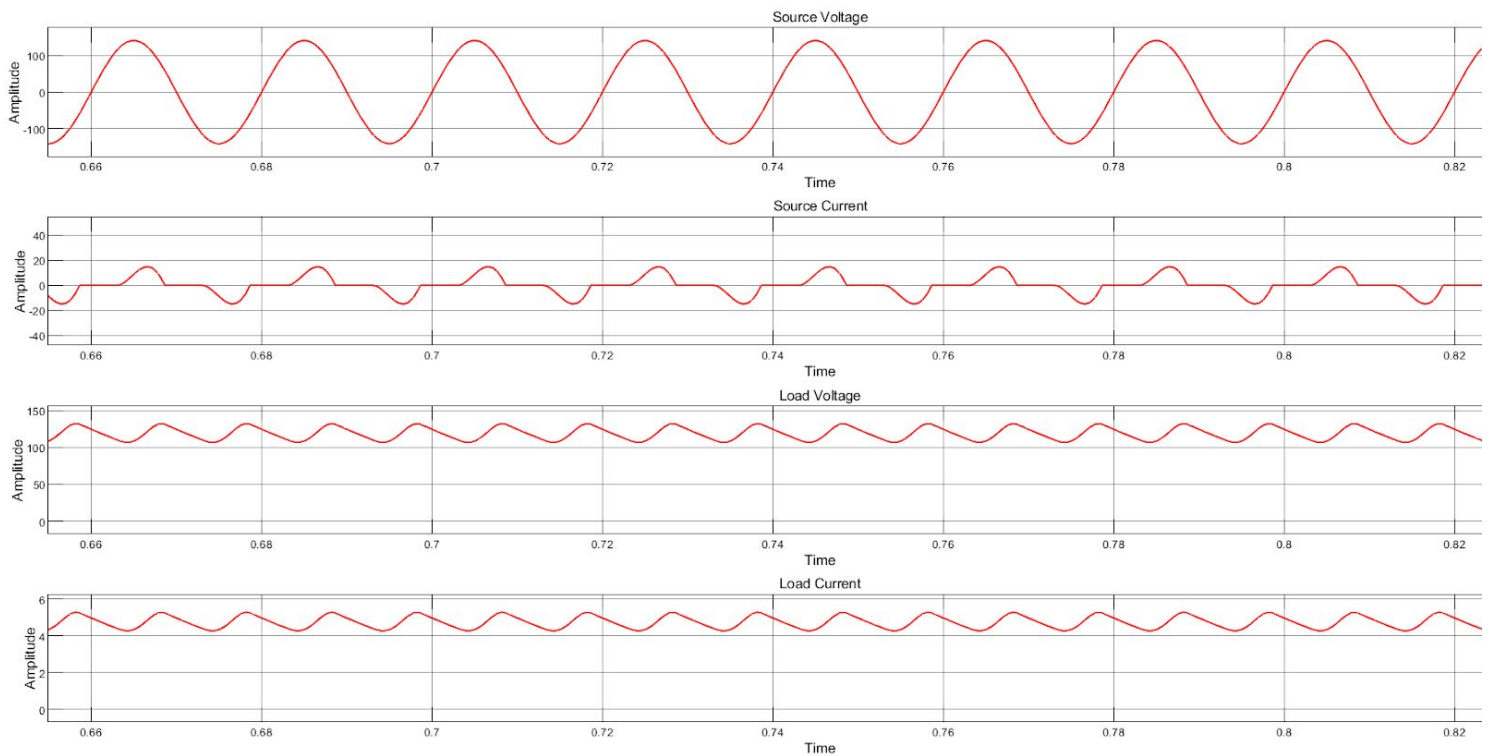**Load Voltage : 247.03%**
Load Current : 247.03%

3. Diode bridge rectifier with LC filter and R load(25 ohms)

Diode bridge rectifier - LC filter
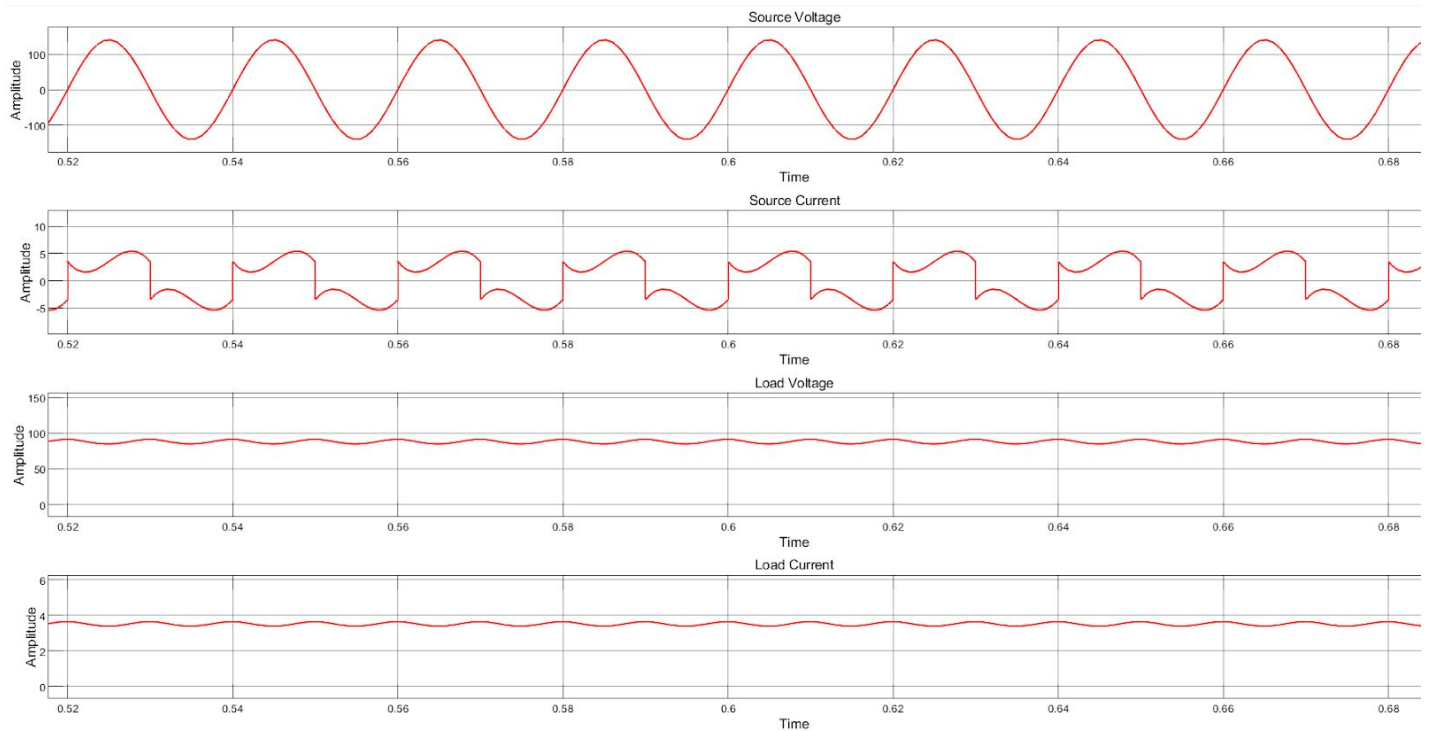

3.1 DCM - C = 1mF, L = 5mH

THD for LC Filter DCM:
Source Voltage : 2.68%
Source Current : 71.14%
Load Voltage : 62.09%
Load Current : 62.09%

3.2 CCM - C = 1mF, L = 50mH

THD for LC Filter CCM:
Source Voltage : 1.86%
Source Current : 48.82%
Load Voltage : 65.20%
Load Current : 65.20 %

4. THD Values table

It can be observed by observing the trends In THD for filters that although adding a capacitive or LC filter decreases the source voltage, load voltage and load current THD. the Source current THD increases as the source current becomes non-sinusoidal and pulsating on addition of a filter. The LC filter works better in the CCM mode and overall the operation of LC filter is better than that of a C filter in reduction of THD.

THD	Source Voltage	Source current	Load Voltage	Load Current
Unfiltered	2.84%	3.29%	2146.54%	2146.54%
C-Filtered	0.75%	86.99%	247.03%	247.03%
LC (DCM)	2.68%	71.14%	62.09%	62.09%
LC (CCM)	1.86%	48.82%	65.20%	65.20%