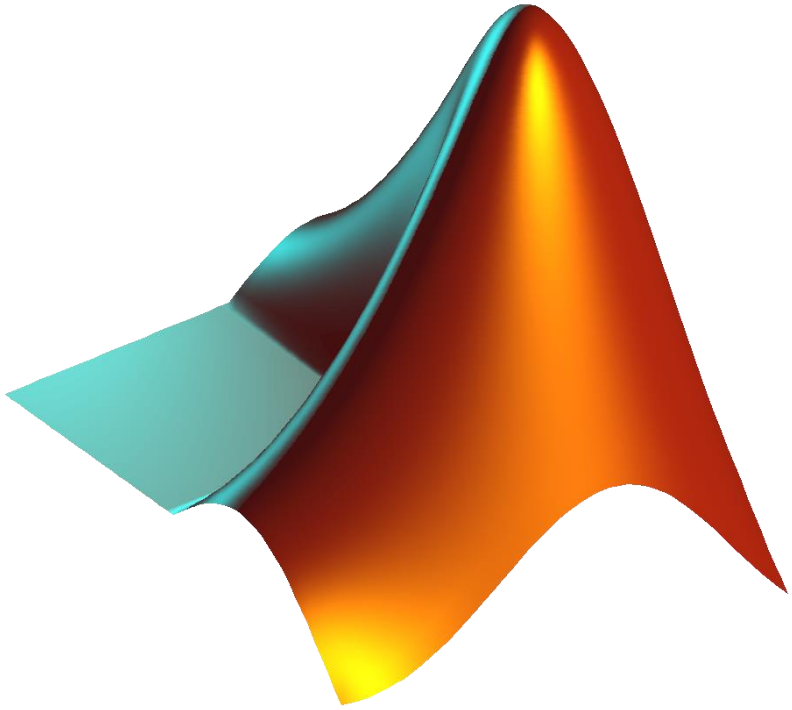
MATLAB Report



Six pulse rectifier

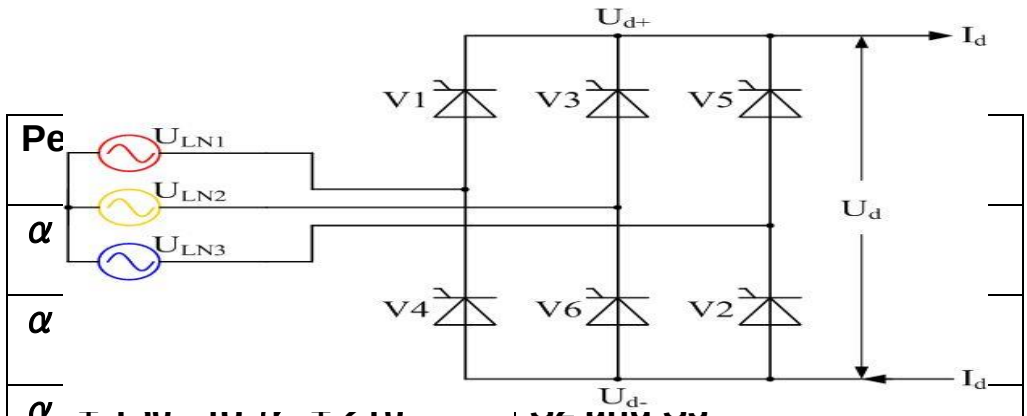
Objective:

To simulate the 3Ø fully Controlled rectifier circuit with R & RL load and obtain the corresponding waveforms using MATLAB/SIMULINK.

Theory:

- The three phase full bridge converter works as three phase AC-DC converter for firing angle delay $00<\alpha\leq900$ and as three phase line commutated inverter for $900<\alpha<1800$. The numbering of SCRs 1, 3, 5 for the positive group and 2, 4, 6 for negative group.
- This numbering scheme is adopted here as it agrees with the sequence of gating of six thyristors in a 3-phase full converter.
- Here each SCR is conduct for 1200. At any time two SCRs, one from positive group and other from negative group must conduct together and this combination must conduct for 600.
- This means commutation occurs for every 600. For ABC phase sequence of three phase supply thyristors conduct in pairs: T1 and T2, T2 and T3, T3 and T4, T4 and T5, T5 and T6, T6 and T1.
- The three-phase, six-pulse thyristor converter, or rectifier inverter, shown in Figure 1, is used in power electronics. This type of circuit gives the highest and most regular output voltage with the least amount of ripple. It can function as a rectifier or, when connected to a correctly polarized dc source, as an inverter.
- This is the static transfer function of a three-phase, six-pulse converter, and is valid only when the on-time of the thyristors is equal to 120°. That is, when the series inductor is large enough to ensure continuous conduction.

Circuit Diagram:



Pe	
α	
α	
α + 150 ° to α + 210	S2 and S3
α + 210 ° to α + 270 °	S3 and S4
α + 270 ° to α + 330 °	S4 and S5
α + 330 ° to α + 360 ° and α + 0 ° to α + 30	S5 and S6

Components:

1- Three phase supply
2- Resistive load 100Ω
3- Inductance load 1mH
4- Bridge firing unit

Procedure:

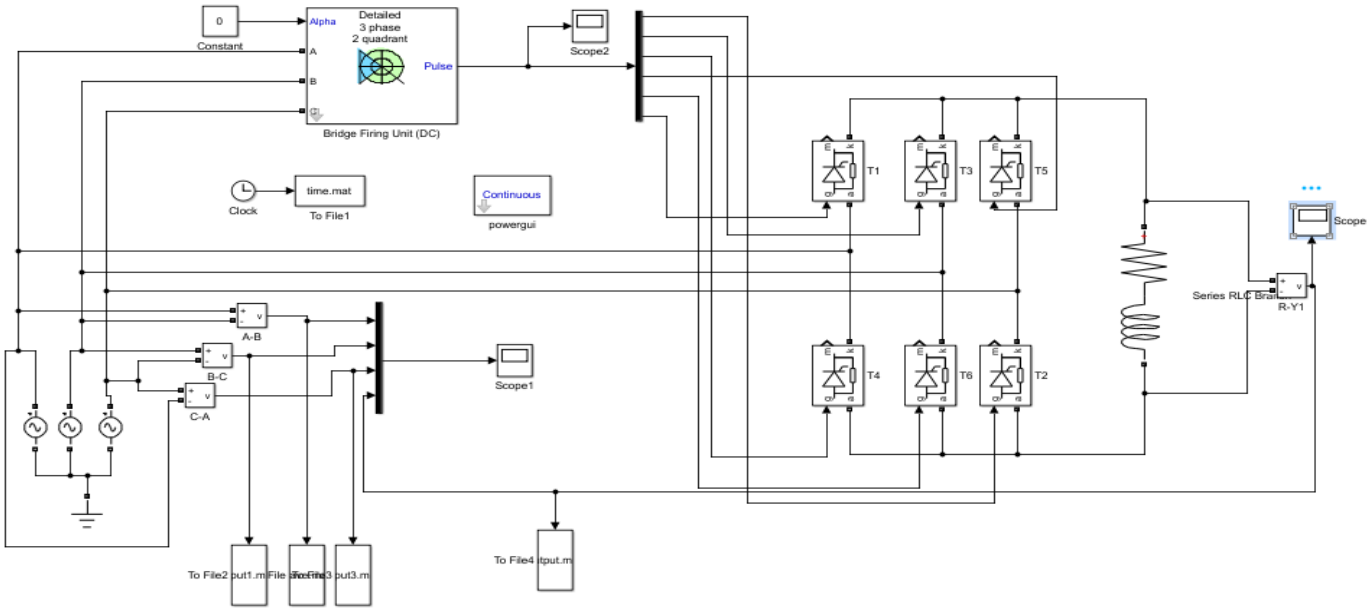
1- Connect the circuit as given on Simulink.
2- Adjust three phase supply to 220V phase RMS Value and frequency 50 Hz.
3- Adjust the bridge firing unit.
   - Frequency of synchronization voltages = 50 Hz.
   - Pulse width = 1 degree.
   - Sample time = 10s.

- Firing angle = 0.

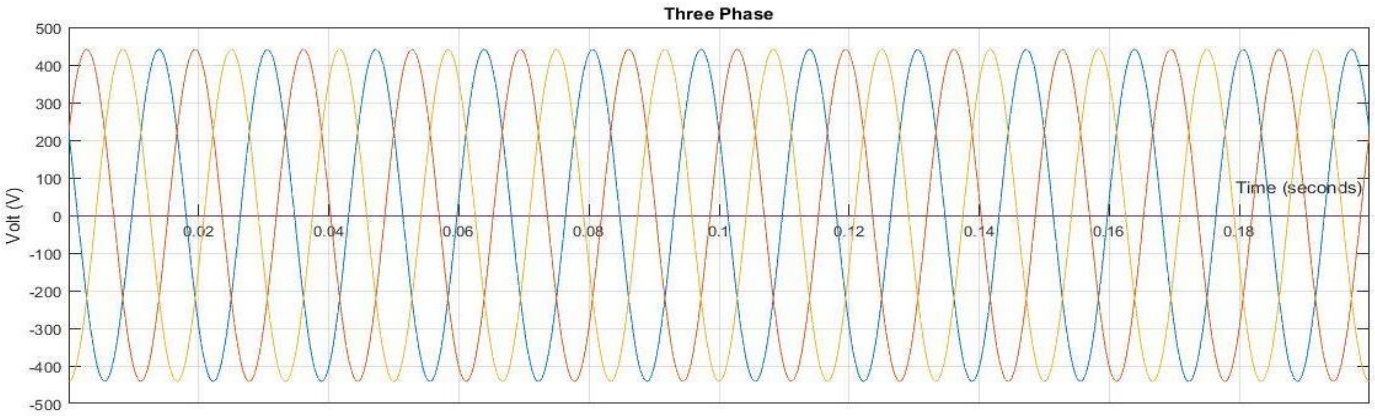
4- Connect the Resistive load, obtain the output.

5- Connect the inductive load, obtain the output.

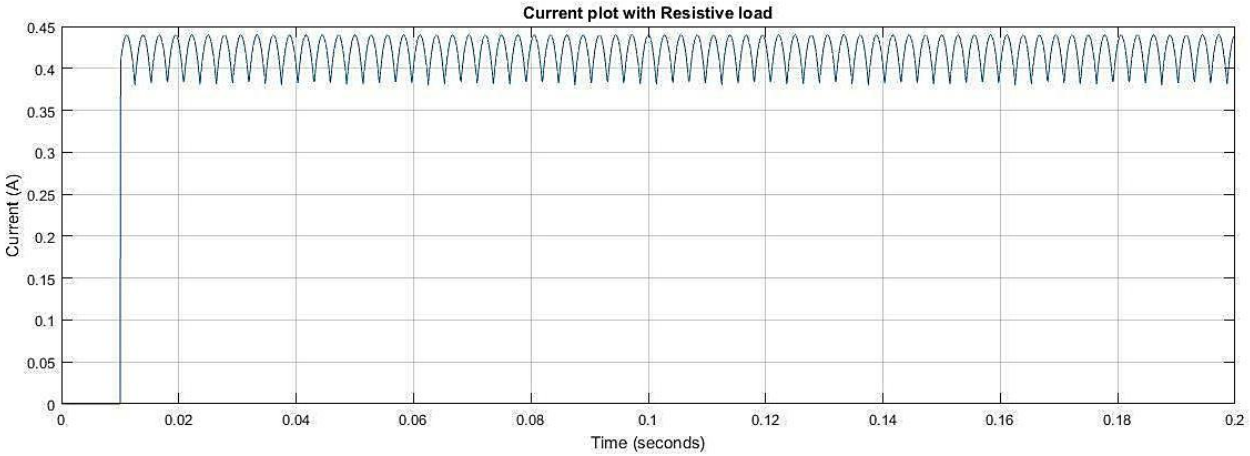
Simulation on matlab Simulink:



Result output:



Resistive Load



Inductive Load