**Circuit Simulation Project**

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

**Title:**

Three-Phase Uncontrolled Rectifier with RL Load and filter circuit.

**Theory/Description:**

Rectifier converts AC supply into DC. Rectifiers are also known as AC-DC converter. Diodes are extensively used in rectifier circuit. Three phase full wave bridge rectifier is used for high power applications shown in Fig. 1. Six diodes are used in between source and load. During the operation of rectifier only two diodes conduct at a time and each will conduct for 1200. The diodes are numbered in order of conduction of sequence. The sequence of conduction D1D2, D2D3, D3D4, D4D5, D5D6 and D6D1. Three phase voltage source is used to fed the rectifier circuit. Va, Vb and Vc voltages having Vm as maximum value, the line voltages Vab, Vbc and Vca . Only one diode from upper side (i.e D1, D3 and D5) and one diode from lower side (i.e D1, D3 and D5) remain turn ON. Diode of same leg never be turn ON at a time.

This circuit simulation of three-phase uncontrolled rectifier with RL load is carried out with a capacitor circuit.

**Circuit Diagram:**

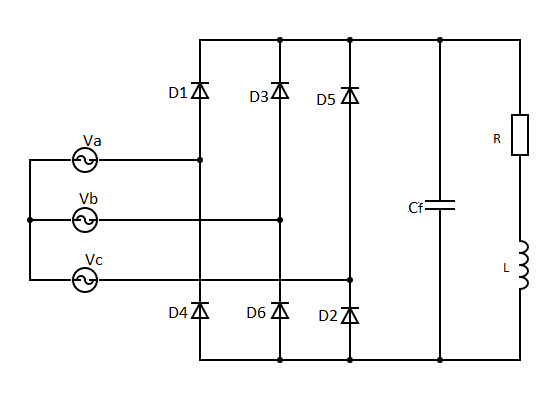


Fig.1 Circuit diagram of three-phase uncontrolled rectifier with RL Load and Filter circuit Cf

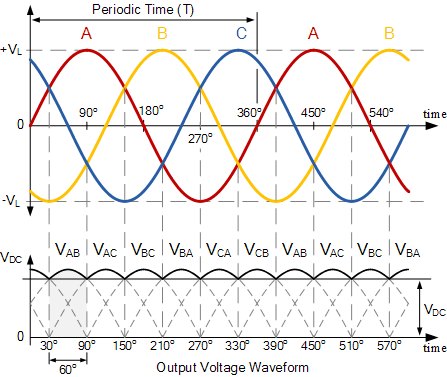


Fig.2 Input/Output voltage waveform of three-phase uncontrolled rectifier with RL Load

**Results/ Output (ngspice and Python plots)**

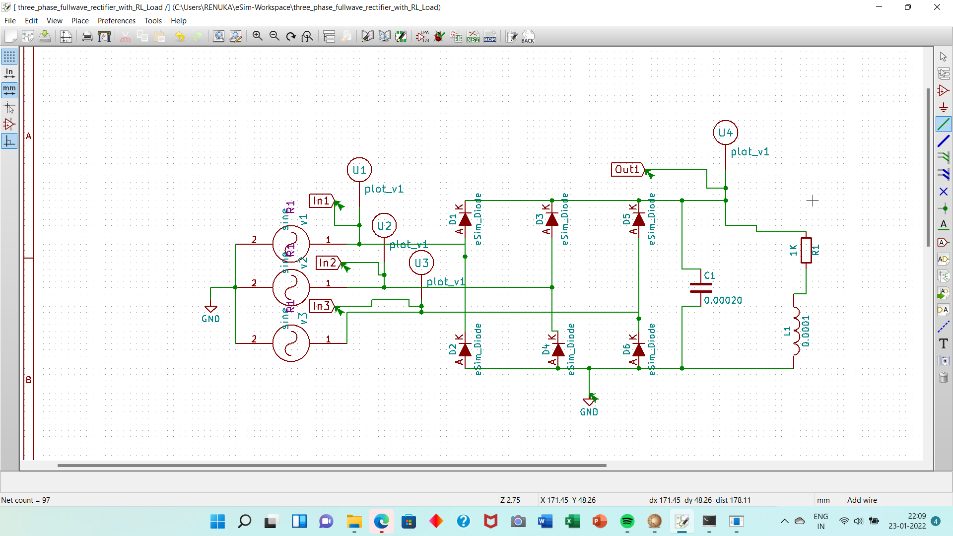


Fig. 3 Three phase uncontrolled rectifier with RL load in esim

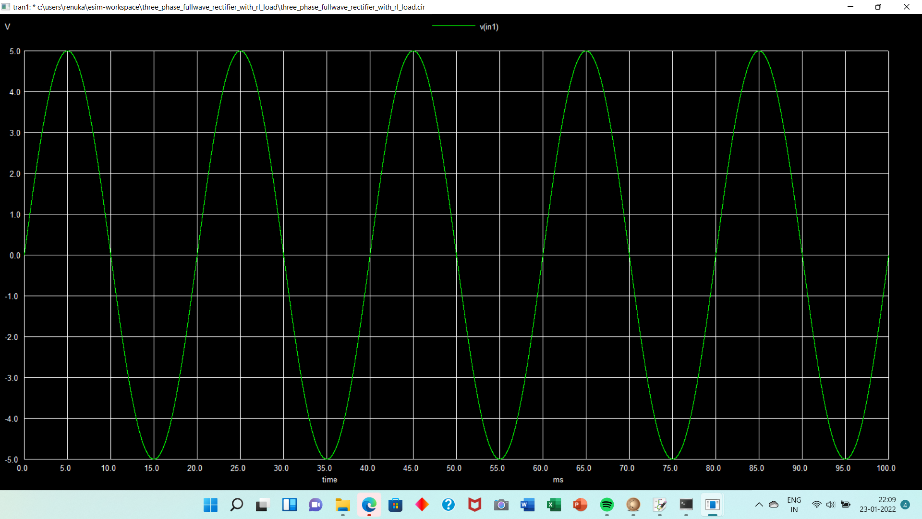


Fig. 4 Ngspice plot of Input Voltage Va

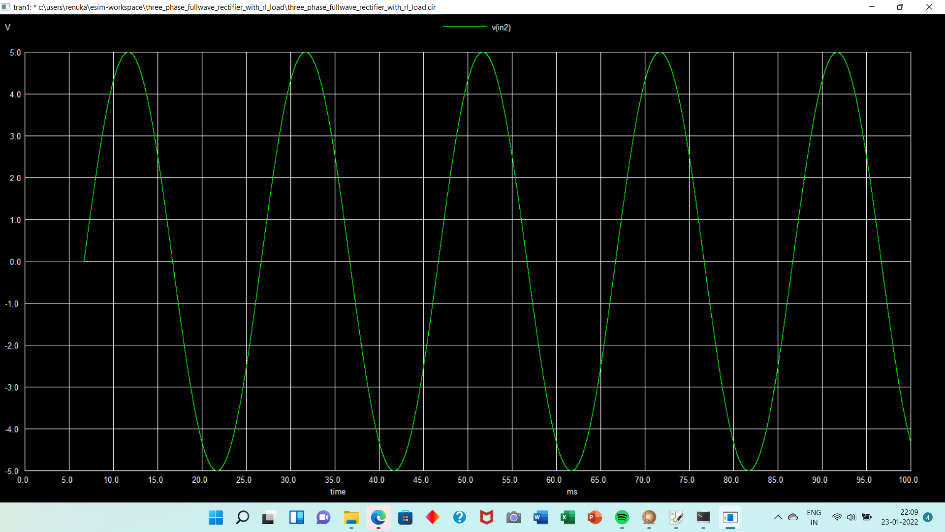


Fig. 5 Ngspice plot of Input Voltage Vb

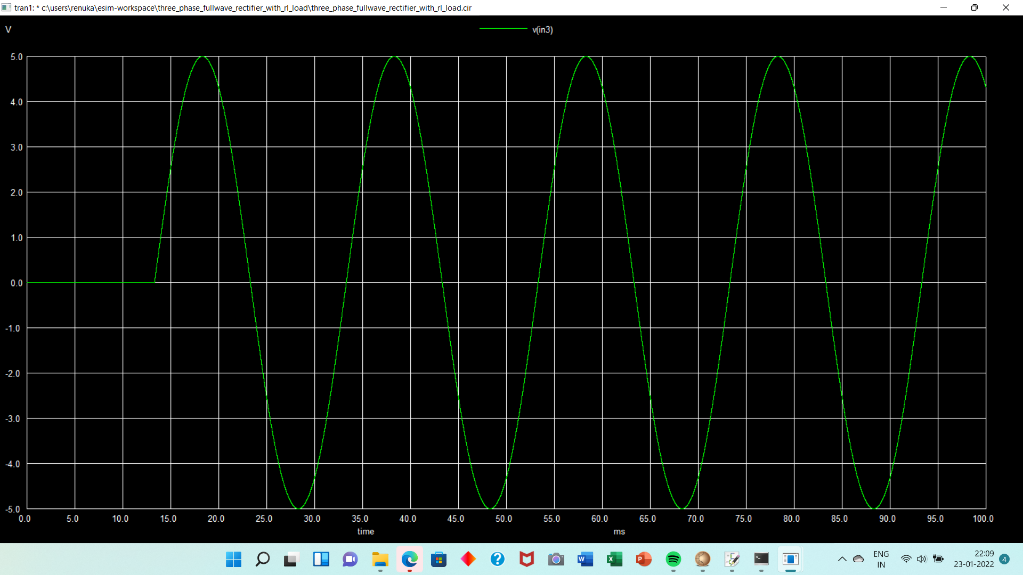


Fig. 5 Ngspice plot of Input Voltage Vc

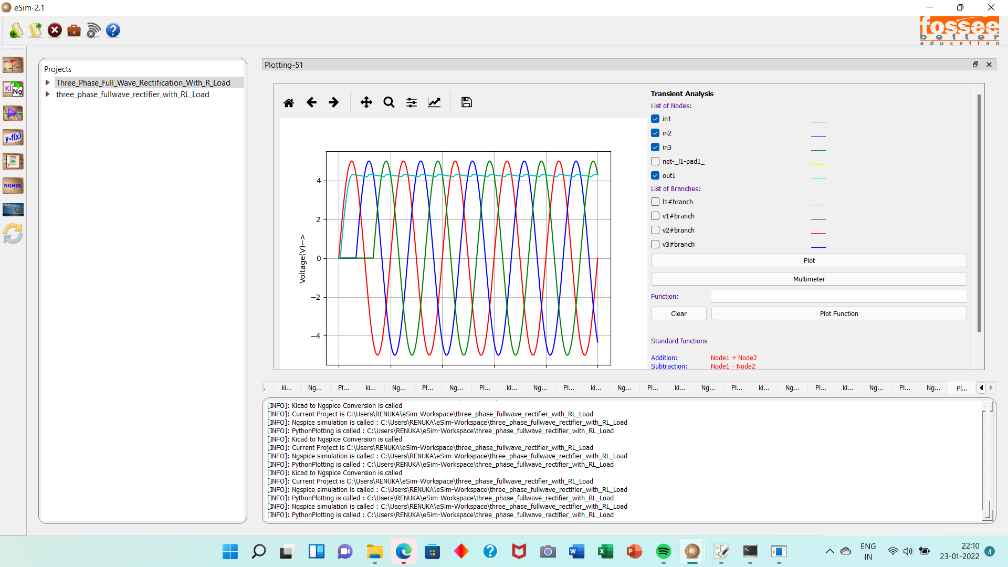


Fig. 6 Python plot of Input/Output Voltage Vs/V0 with RL load and filter circuit

**Conclusion:** Three phase diode based full wave rectifier is simulate successfully using esim tool.

**Source/Reference(s):** P.S.Bimbhra, *Power Electronics* , 4th ed, Khanna Publisher, 2009, pp.85-89.