# AN ANALYSIS OF MULTILEVEL PV BASED SINGLE PHASE REVERSE VOLTAGE INVERTER

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**ABSTRACT:**

Dc converters are employed in high-power and elevated situations. Their performance is superior thanthat of a conventional two-level inverter because they have less harmonic distortion. The reverse bias converter, a form of multilayer inverter used with solar panels, is covered in this study. The SHE method is used for its modulation. A smaller gate driving circuit and fewer power electronics parts were needed for the reverse voltage multilayer inverter. Because of all of these factors, it is less complicated and has a very low overall cost. A seven-level reverse polarity MLI is modelled in Matlab, and the results are shown in the paper.

**KEYWORDS:**inverter,Multilevelpower.

## I.INTRODUCTION

More than 20 years ago, multilevel energy converter was first offered. The fundamental idea is to use a larger number of current switching devices to perform modest voltage shifts in power converters. When compared to a traditional inverter, MLI has a number of benefits. Lower voltage steps result in improved power quality waveforms, as well as less voltage (dv/dt) strain on the load and worries about electromagnetic compatibility[1]. Another essential aspect of matrix inverter is that the transistors are connected in series, allowing for higher voltage performance. The parallel connection, on the other hand, is usually built using switching devices, which removes the risk of overvoltage [2].

The synthesised output voltage waveform has much more stages as the number of layers grows, resulting in a staircase waveform that resembles the desired waveform [3]. Due to the large number of semiconductor technology, redundant switches can be used to handle voltage equalization. However, another multilayer converter could be necessary for a complete resolution to the voltage-balancing problem [4]. Industrial motors [5], hybrid ac / dc systems (FACTS) [6]–[8], and vehicle power [9], [10] are some of the applications for these novel converters. Hybrid systems are particularly well suited to the field of renewable solar photovoltaic, where maximum energy quality are critical [11]. A multi winding transformers is used to generate the multilayer output in [12] and [13]. The layout and design, on the other hand,

## II. REVERSE VOLTAGE TOPOLOGY MULTILEVEL INVERTER

It is a hybrid multilayer architecture in which the voltage output is split into two portions. The schematic diagram of a reverse bias inverter topologies is shown in Figure 1. To generate the multilayer voltage output, the architecture mixes the two portions (frequency range and

infrasound). To create a complete multilevel input, the high-frequency component (level generation) generates positive levels, which are then sent to a full-bridge inverters (polarity creation), which generates the needed polarity for the outcome. Many of the switching devices that were responsible for generating the output voltages in favourable and unfavourable polarities will be eliminated as a result of this.

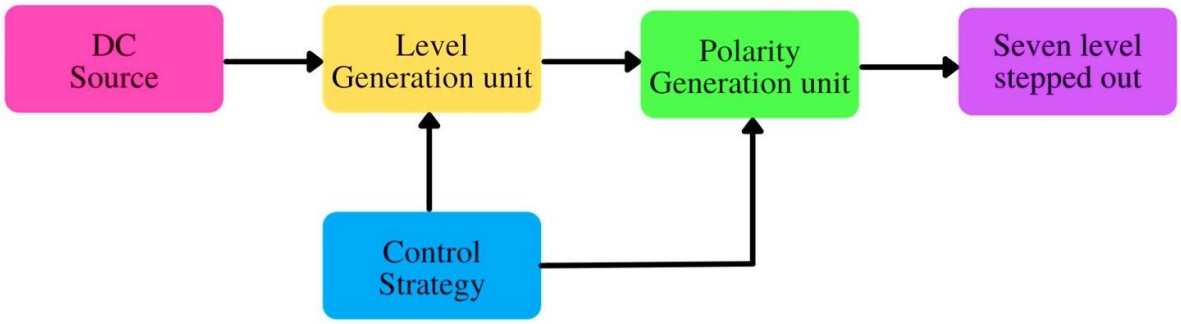



Fig.1Reverse Voltage Multilevel Inverter Block Diagram

Figure 2 depicts the Reverse Voltage architecture in seven levels. As can be seen, ten switches and three separated sources are required.

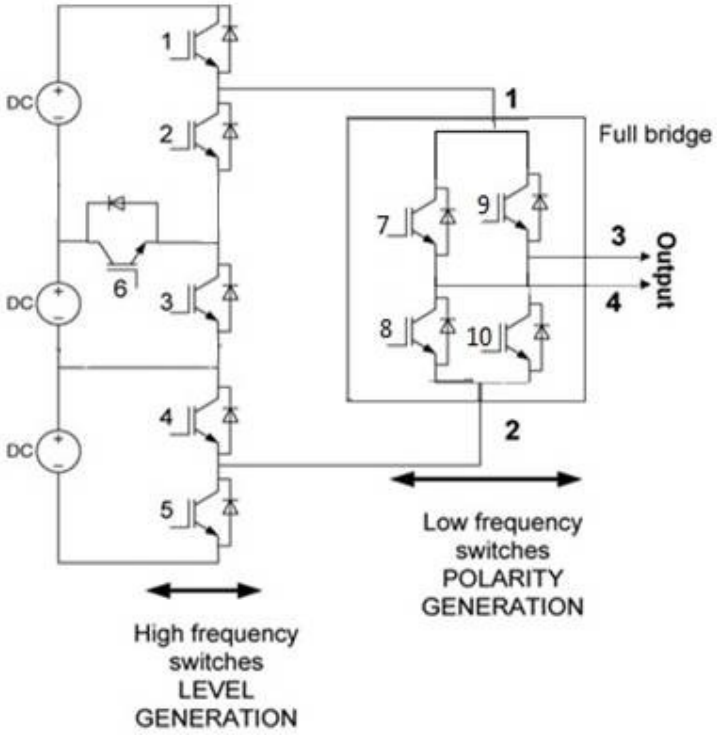
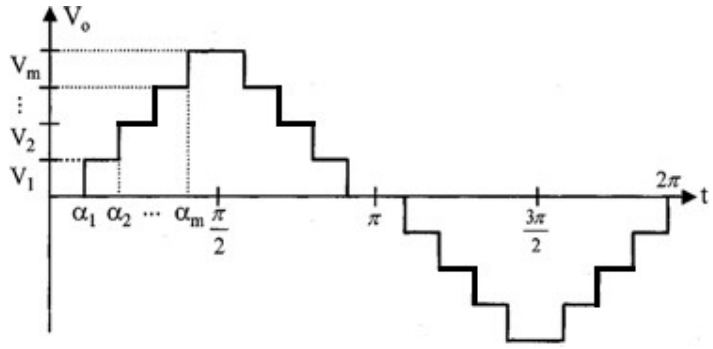



Fig.2only one phase Reverse voltage with seven levels Inverter with many levels

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## IV. BOOSTCONVERTER

A boost converter was a crucial component of a photovoltaic system. The output voltage of a boost converter is higher than the input power. The equivalent circuit of a boost converter is shown in Figure 4. It's a type of switched - mode power supply with at least two switching devices and at least 1 storage component like a capacitance or an inductive.

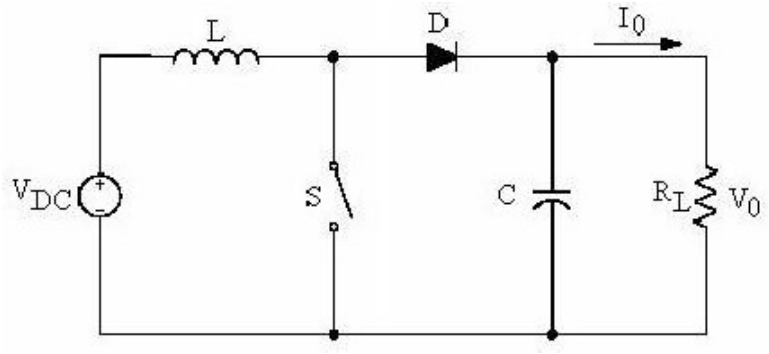



Fig.4Convertor boost

When the switch is turned off, the capacitor gets charged by the battery and stores the energy. The current in the inductor grows dramatically in this mode. Because the diode prevents current from flowing, the load current remains constant despite the battery being discharged. When the switch is activated, the diode shorts out. The stored energy is released via the opposite sign, which charges the capacitor and maintains a steady load current throughout the operation.

## v. SOLARPHOTOVOLTICCELL

PV electrification represents a significant source of renewable energy. Due to varying solar intensity, the electric generated straight from solar irradiation via PV panels is not consistent. P&O MPPT has been integrated into the PV system to maximise the output power of the PV panels. MPPT may change the PV voltage level and seek for the max output that the Pv module can output using a quid DC-DC converter [14].

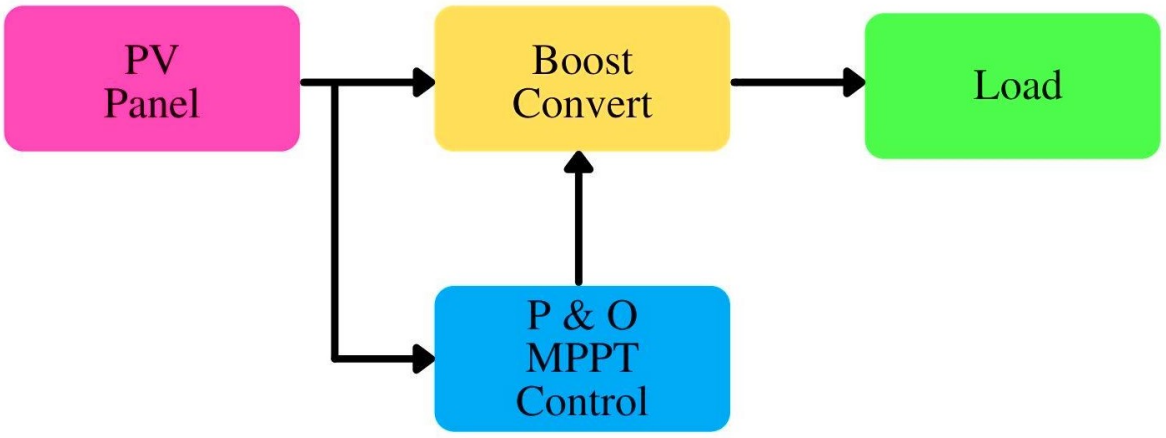
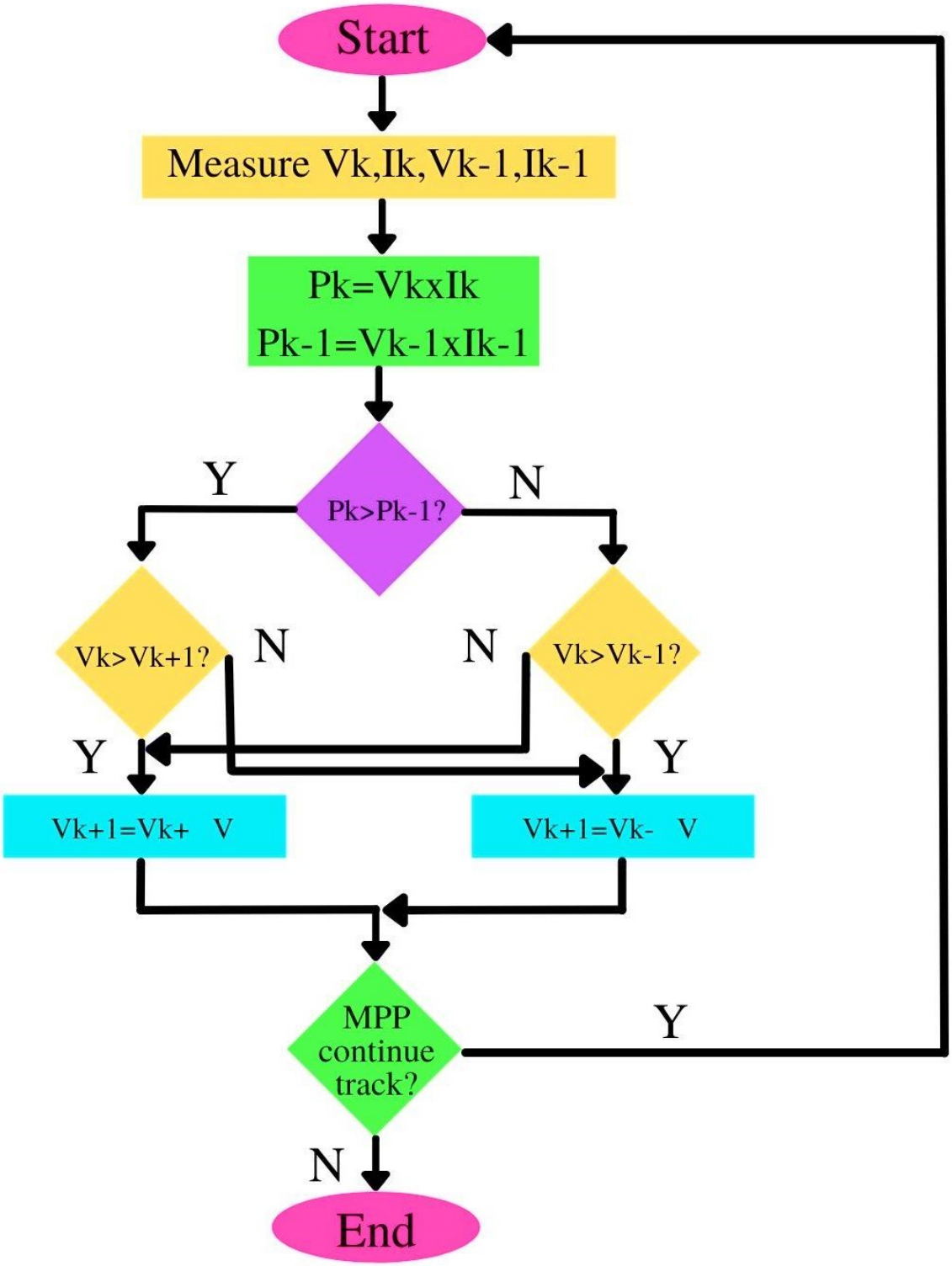



Fig.4 MPPT Solar PV System based on P and O

This method compares the PV output power at the current and prior perturbation cycles by applying a small increase or decrease in operating voltage to the panel [16]-[18]. The operation of the P&O MPPT is shown in Figure 5.


Start
Measure Vk,Ik,Vk-1,Ik-1
Pk=VkxIk
Pk-1=Vk-1xIk-1
Pk>Pk-1?
Y
N
Vk>Vk+1?
Vk>Vk-1?
N
N
Y
Y
Vk+1=Vk+ V
Vk+1=Vk- V
MPP continue track?
Y
N
End

## VI. RESULT ANDDISCUSSION

The simulation model of a seven-level reverse bias inverter topologies is shown in Figure 6. IGBTs are employed as a switch and three independent dc voltage sources are used. Ten valves have been used in a six reverse bias inverter topologies. For level creation, six valves are employed, and for polarity creation, an h-bride is used.

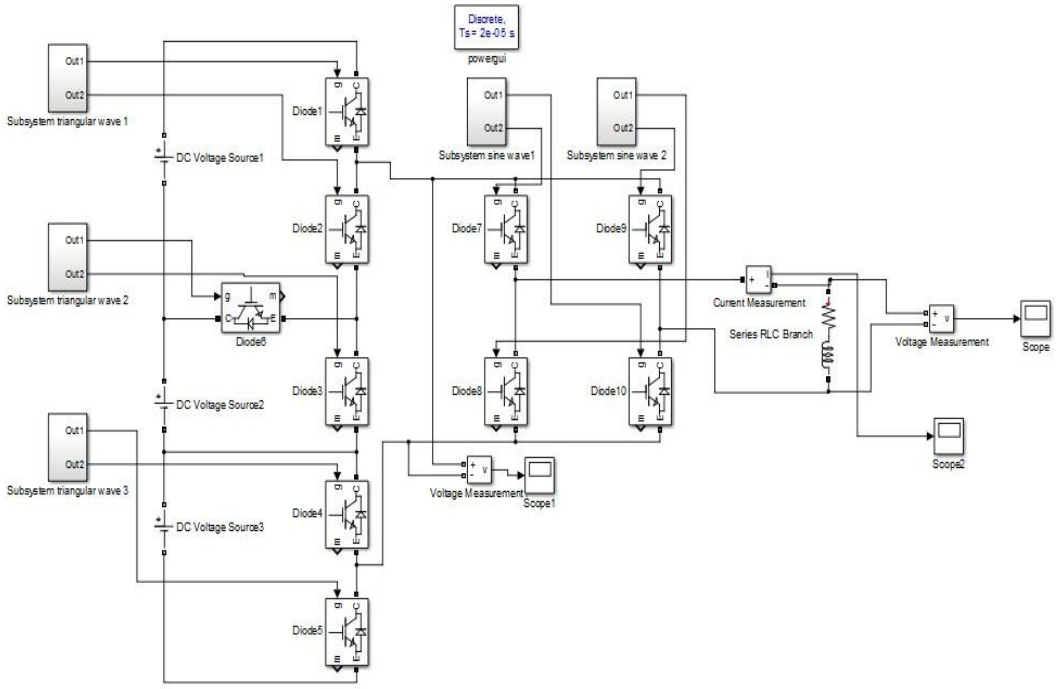



Fig.6 Reverse Voltage in a Single Phase

The voltage output is stepped up using an MLI Boost converter. We was using the buck converter to enhance the output voltage of the PV system when we didn't acquire the desired voltage output from the PV system. Figure 7(a) depicts the boost converter, whereas Figure 7(b) depicts the boost converter's voltage output.

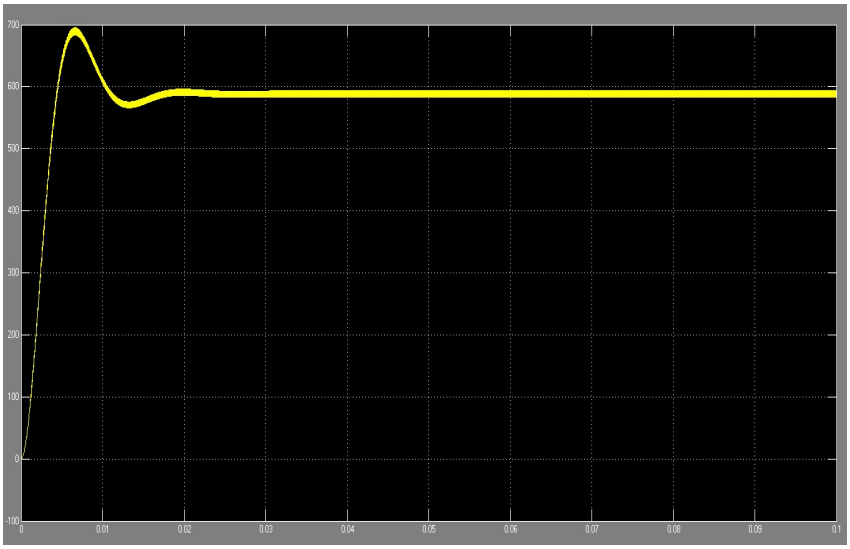


Fig.7(b) Boost Converter output voltage

The photovoltaic network is linked to the power converter in fig. 8(a). The boost converter receives the voltage of the PV module. This result is often used as a boost converter's analog input. The variable voltage characteristics are shown in Figure 8(b), and the volt - ampere patterns are shown in Figure 8(c).

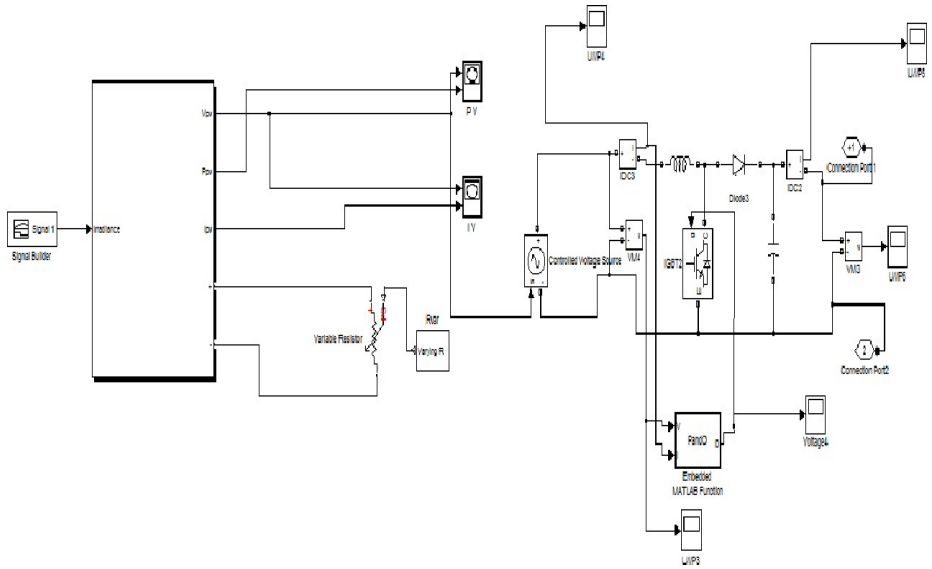



Fig.8(a)When used in conjunction with a PV system, the Boost Converter

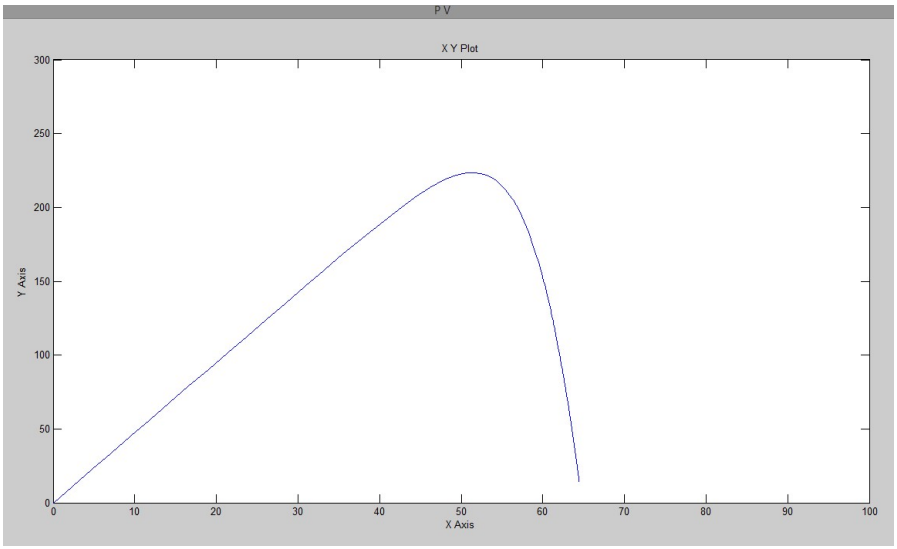



Fig.8(b)Curve of power voltage

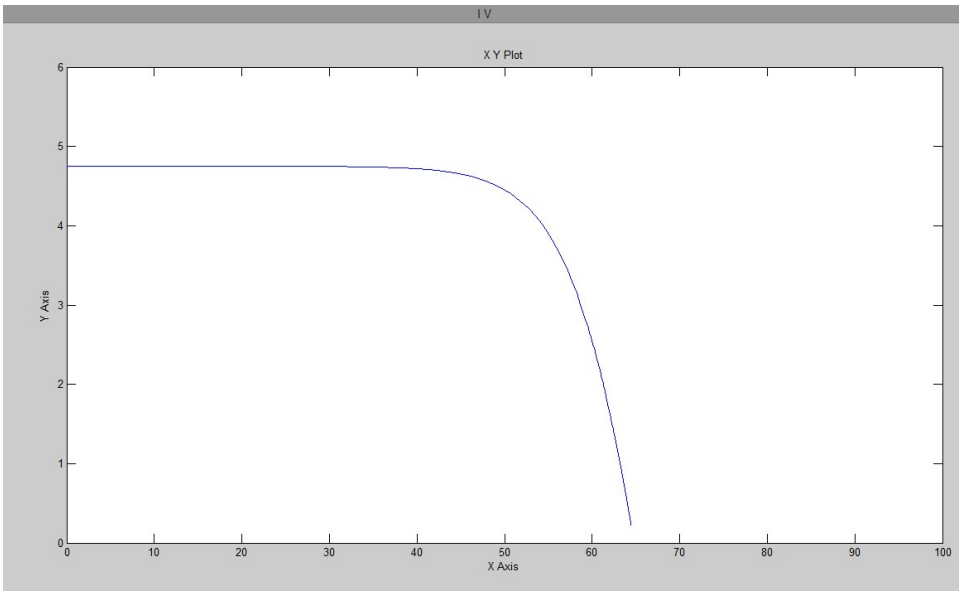



Fig.8(c)Curve of CurrentVoltage

The simulation tool of a pv-based single stage reverse polarity multilayer inverter is shown in fig. 9. In this diagram, the pv model is provided a continuous signal and a peak power is monitored. The output is then sent to a power converter. The boost converter raises the voltage level and sends the result to a reverse voltage inverter topologies. We receive seven levels at the output of this reverse bias inverter topologies.

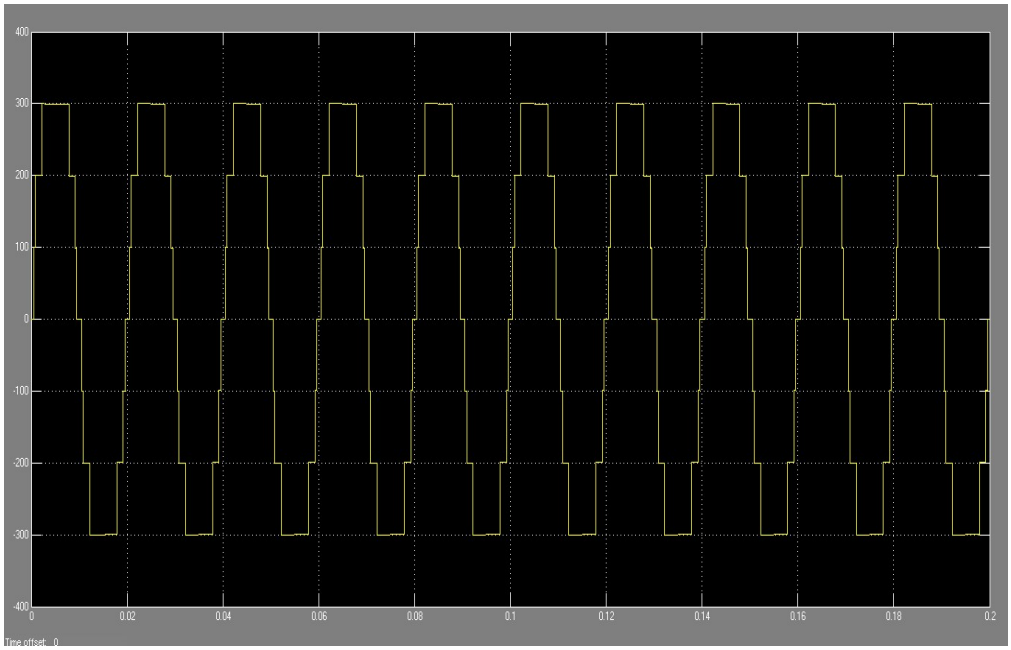



Fig.9(b)Reverse Voltage Output Waveform with Seven Levels

## VII. CONCLUSION

The primary goal of this thesis was to investigate the reverse voltage multilayer inverter based on photovoltaics. A PV array, boost converter, and reverse voltage 7-level inverter are simulated using a Matlab/Simulink model. Using the Perturb and observation (P & O) approach, the output waveform is analysed and the maximum power point is followed.

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