Battery Powered By The Pv System Using Multilevel Inverter At 5 Level To Maximise The Efficiency

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ABSTRACT: The multilevel converters has been recently considered as emerging alternatives in low and medium range power applications instead of solid state converting units. Multilevel inverters i.e. voltage source inverter has been establish with special features as compared to their conventional devices. One of the main features is that filter requirement has been reduced by getting the staircase output waveforms of low harmonics distortion from the various level DC sources. This makes multilevel inverter technology attractive for battery powered by the PV applications. In this Paper, discuss on operation of cascaded PV panels with MLI and its efficiency.

Key Words: Multilevel inverter; generator Cells; Battery powered by the sun; PMSM..

I. INTRODUCTION

In recent scenario, there had been an increase in the use of renewable energy due to the shortage of non-renewable energy resources withits environment impact. As the result, solar power has become promising energy resourceswith respective to green energy. The idea of green energy has been supported by the governments by providing subsidiary for utility companies such that installations of PV panels with an exponential growth output.In the recent years the power electronic converter technology plays a vital role in real Renewable energy sector with their development .The power switches used to transfer significant levels of power, in recent times , convertersemerging a new structure to provide high switching frequencies. The obtained performances can be used in renewable energy power sector.

II. MATHEMATICAL MODEL OF BATTERY POWERED BY THE SOLAR ENERGY

Several models had been implemented that describes its performance and behaviour with different climatic conditions (intensity & Celsius) .Here the model had been analysed with one diode with exponential in nature..
Fig 1.shows the electrical model

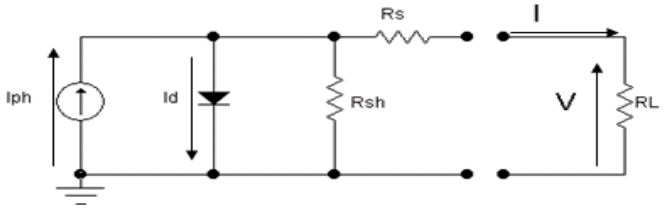

Fig. 1. Electrical Scheme of a battery with diode

An expression for current-voltage characteristic is

$$I = I_{ph} - I_S \times [\exp(\frac{q \times (V + R_s \times I)}{A \times k \times T}) - 1] - \frac{V + R_s \times I}{R_{sh}} \quad (1)$$

Thus, the equivalent scheme of a battery powered by the solar energy is given in fig.2.

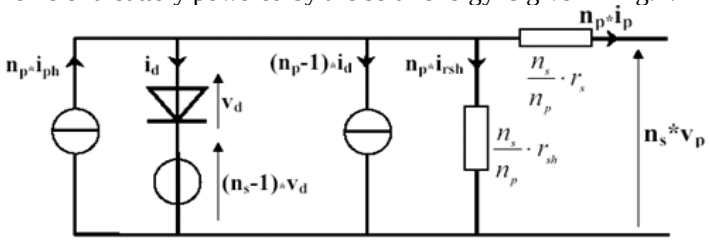

Fig. 2. Equivalent scheme of battery powered by the Solar Energy

The expression is given below in terms of

$$I_g = I_{ph,g} - I_{s,g}\left[\exp\left(q\frac{V_g + R_{s,g}I_g}{AkN_{ms}T}\right) - 1\right] - \frac{V_g + R_{s,g}I_g}{R_{sh,g}} \quad (2)$$

we have used battery MSX-83 powered by the solar energyi.e.36 cells in series connection
The figures 3 and 4 represents respectively current–voltagecharacteristics for a rated temperature T=20-25° and intensity of light E=1000W/m2.

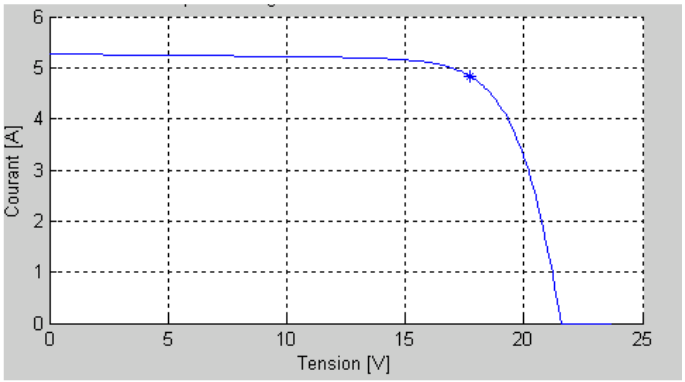

Fig. 3. Current–voltage Characteristic Battery powered by the solar energy

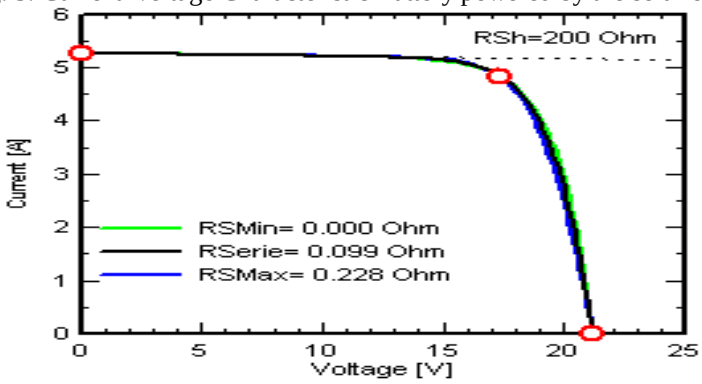

Fig. 4. Real V-I characteristics of PV System

III. FIVE LEVEL VSI –NPC TYPE

Normally this type of inverter is used for V/F controlfor high power applicationswith Neutral Point Clamping (NPC)topology for N-level inverter structure as shown in Fig 5.

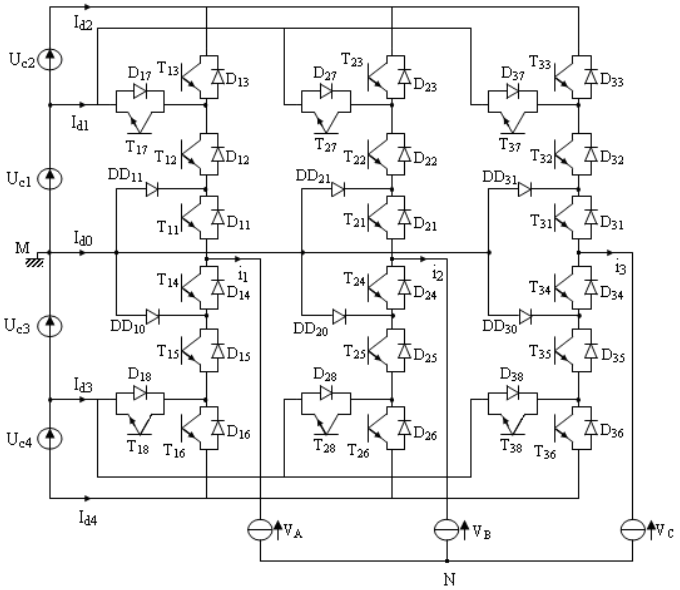

Fig. 5. A 5-level NPC VSI

This converter has four DCvoltages sourceswith three arms . It also has eight bidirectionalswitches in one arm , six switches are in series connection and other two switches are in parallel connection.

IV. N LEVEL NPC-VSI PWM STRATEGY (N=5)

Fig 6.shows the signals of NPC.

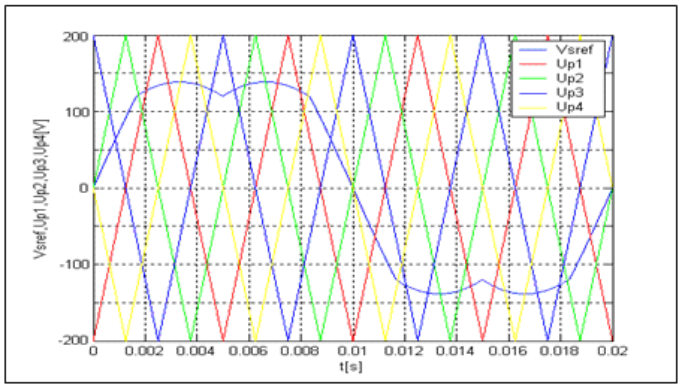

Fig .6. NPC-VSI PWM Strategy

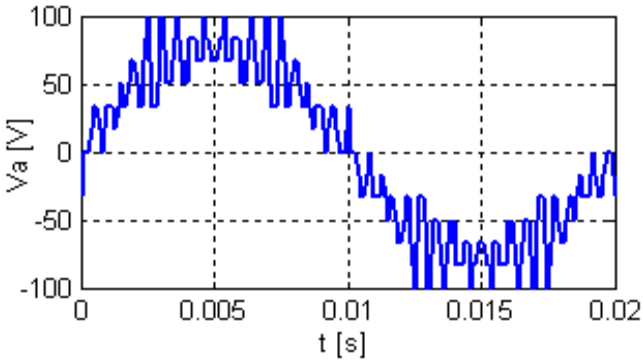

Fig .7. NPC-5 level output

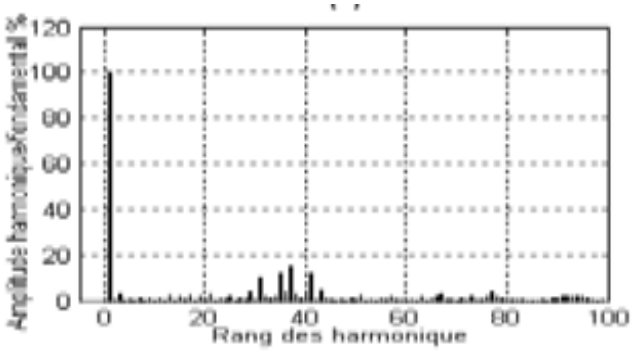

Fig .8.Voltage & its Spectrum output (m=10)

The voltage with respective to output side issymmetry to the ¼ thof the period for even integers of m. There is existence of harmonics for all odd values.An occurrence of harmonics is in multiples of 4mf.

V. CASCADE OF BATTERY POWERED BY THE SOLAR ENERGY FOR PMSM

From the solar powered DC battery output is given to NPC VSI five level Inverter. To study an generated input DC voltage there are various techniques are used, one of the techniques we followed is cascade

connection of four constitute battery powered by the solar energy act as input to NPC VSI five level inverter which feeds a PMSM.

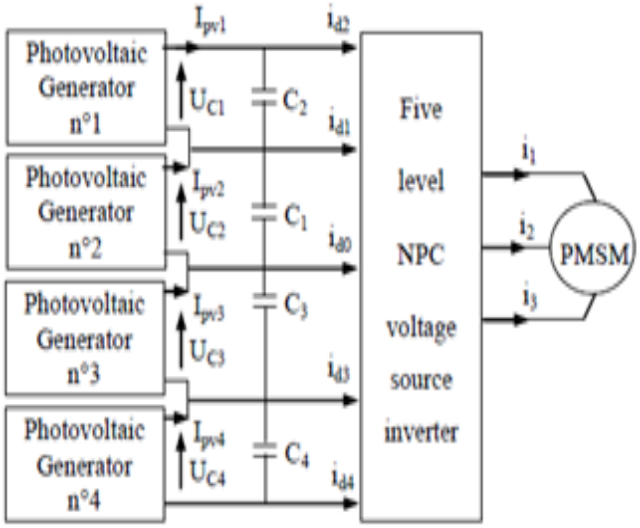

Fig.9. PV cell fed NPC-5 level VSI fed PMSM

5.1. Modelling of Filter

Layout of filter used as intermediate between battery and inverter is shown in fig 10.

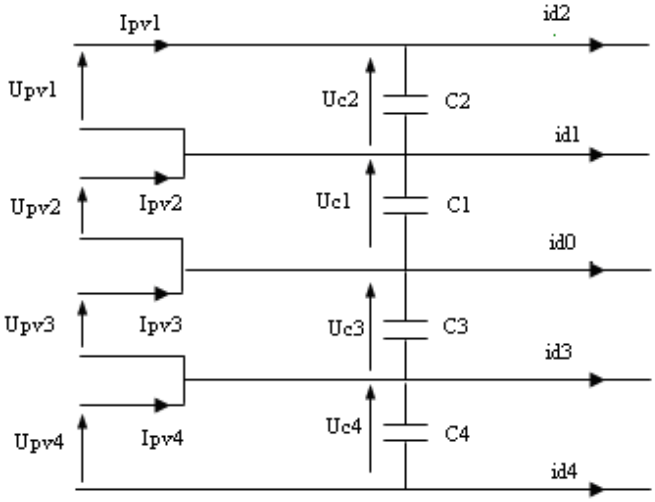

Fig. 10. Structure of filter

5.2. Simulation results

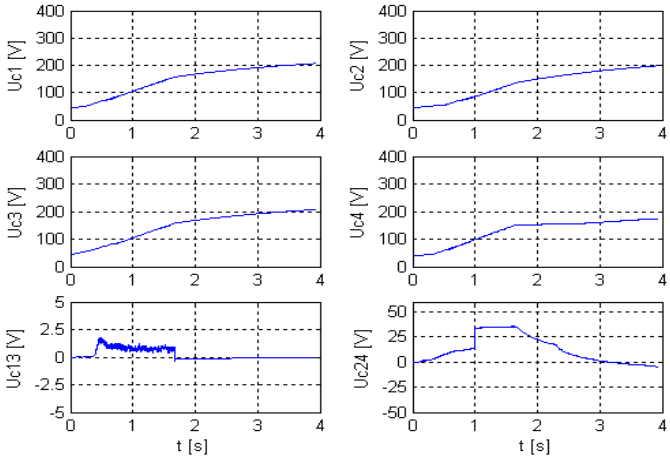

Fig. 11. Varying Input voltagesat various levels

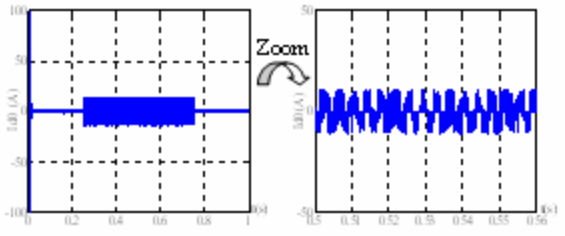

Fig.12. NPC VSI five level inverter input current

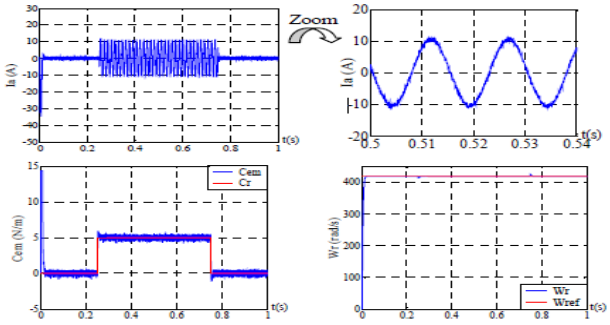

Fig.13. Performances of PMSM

Theinitial current(id_0) has average value practically obtained as Zero as shown in fig.12 and output current is nearly sine wave in nature. Fig.13 describes thenature of torque and speed at t=1.5 secs and t=2.5 secs.

VI. CONCLUSION

The NPC-VSI five level inverterstudied the performances of series connected of the battery powered by the solar energy connected with PMSM through multilevelinverter. The 5-level -VSI modellingresembles to four numbers of two-level inverters connected in series manner. The strategy used to impart two-level inverter to NPC-VSI 5 level inverter is extrapolate using characteristic of cascade connection.The performances were analyse and it is suitable to use on renewable energy sector .

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