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A New Modified Artificial Neural Network Based MPPT Controller for the Improved Performance of an Asynchronous Motor Drive

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Abstract

Objectives: To improve the performance of asynchronous motor drive, the proposed Artificial Neural Network (ANN) based Maximum Power Point Tracking (MPPT) controller has been used to fed the asynchronous motor drive with the obtained output voltage and currents of PV MPPT. **Methods and Analysis:** DC-DC boost converter and space vector modulation technique inverter are used to provide the required supply to the load. The proposed ANN based MPPT improves the system efficiency even at abnormal weather conditions. **Findings:** Solar energy is an important alternative out of the various renewable energy sources. On an average the sunshine hour in India is about 6hrs per day also the sun shines in India is about 9 months in a year. To generate electricity from the sun, the Solar Photo Voltaic (SPV) modules are used. The SPV comes in various power outputs to meet the load requirements. Maximization of power from a solar photo voltaic module is a special case to increase the efficiency of the system. The proposed artificial neural network (ANN) based MPPT controller is used to track the maximum power. DC-DC boost converter and space vector modulation technique inverter are used to provide the required supply to the load. The proposed ANN based MPPT improves the system efficiency even at abnormal weather conditions. Torque and current ripple contents have been reduced to a large extent with the help of proposed ANN based MPPT for an asynchronous motor drive. Also the better performance of an asynchronous motor drive is analyzed by the comparison of existed conventional and proposed MPPT controller using Matlab-simulation results. **Improvement:** Improvements in torque and current ripple and better speed performances are clearly analyzed with the help of practical validations. And also few of the observations are carried out and tabulated.

Keywords: Artificial Neural Network (ANN), Asynchronous Motor (ASM) drive, DC-DC Boost Converter, Maximum Power Point Tracking (MPPT) Controller, Ripple, Solar Photovoltaic (SPV) System, Space Vector Modulation (SVM), Torque

1. Introduction

As the earth's natural resources are decreasing day by day, to meet the increase in the power demand the power sector is looking at alternate energy resources. Due to usage of renewable energy sources the carbon content in the atmosphere can be reduced by which global warming problem can be overcome. Out of various renewable sources solar PV System is leading now a day due to its simple structure. The various structure of PV panel system and their suitability for locations have discussed[1-4]. The performance of the PV system can be improved by using power electronic devices along with maximum power point controller.

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Several MPPT techniques were developed to track the maximum power point (MPP) efficiently. Most of the existing MPPT techniques suffer from the drawbacks of slow tracking, wrong tracking and oscillations during rapidly changing weather conditions, which reduces the utilization efficiency. To overcome this, an ANN based MPPT is implemented. Here two stage MPPT is implemented to improve non uniform irradiance on the PV system. Blocking diode is connected in series to prevent the reverse current flow from the load, a bypass diode is also used to enhance the power capture and also to prevent hotspots[5-7]. ANN based MPPT with 2 stage method for MPP presents the independent of time dependency and trade property, due to which MPP can be tracked without time increment through PV characteristic changes[8,9]. The nonlinear characteristics of array with rapidly changing irradiation and temperature can be overcome using differential Evolution (DE) and ANN along with conventional MPPT[10].

A modified ANN based MPPT is introduced by using the Incremental Conductance method using sensors to get better performance. Compared to Incremental Conductance and the PandO technique it is much faster for the sudden change of the climatical combinations. To evaluate the effectiveness of the network the least mean square error is introduced to give accuracy of the network[11]. The 2-level genetic algorithm based neural network (NN) is used to estimate the battery power for influencing the factors as light intensity, temperature and battery junction temperature[12]. A recurrent NN model is trained by a Particle Swarm Optimization (PSO) method for solar radiation observation and controlling to predict the accurate solar radiation of standalone systems of hybrid power systems[13].

3 layered ANN with back propagation based MPPT is implemented for boost converter of standalone PV system to minimize the long term system losses and to increase the conversion efficiency even under variable temperature[14]. PV module energy conversion efficiency lies in between 12%-20%. The energy conversion loss depends on PV system and also the loads that are connected. This can be overcome using MPPT with DC-DC converter to get the required load voltage at the maximum power point voltage[15-18]. Solar energy is a major untapped resource in a tropical regional country like India. India plans to produce 20 Giga watts of solar by 2020. A MPPT controller with the inverter is connected to the asynchronous motor drive with space vector modulation technique to get the better performance with the PV system. Various strategies are used for selecting the vectors orders with zero vectors in reducing the harmonic content and switching losses[19,20].

The space vector modulation technique of an inverter is composed with number of sub hexagons. The sector identification can be done by using the triangle, which encloses the tip of the reference space vector model with forming of six regions[21-23]. To overcome the distortions in the output voltage and currents of an inverter, the single phase SVM based cascaded H-Bridge multilevel inverter is used for PV system to improve the power quality even under abnormal weather conditions. The better torque ripple is obtained with the help of genetic algorithm based particle swarm optimization based indirect vector control for torque control of an induction motor drive[24]. A comparison of neuro fuzzy with space vector modulation technique neural network and conventional based system has been presented[25].

The advantage of this proposed ANN based MPPT algorithm is to control the MPP even under abnormal weather conditions, compared to other conventional algorithms. In section 2 mathematical modeling of PV array is discussed. Section 3 explains about the proposed MPPT algorithm. Mathematical modeling of asynchronous motor drive is discussed in section 4. Section 5 states a brief note on proposed space vector modulation technique. Using the proposed MPPT along with boost converter to boost up the PV output and to feed asynchronous motor drive is detected in section 6. Matlab-simulation results with the comparison of conventional and proposed MPPT techniques are available in section 7 and the concluding marks are illustrated in section 8.

2. Mathematical Modeling of PV Array

Solar photovoltaic system is made of photovoltaic cells. Cells are connected to form panels and panels are grouped to form array. The basic mathematical equations describe the ideal PV cell and those are clearly mentioned in equations (1) and (2)

$$I_{MD} = I_{PVCELL} - I_{OCELL}\left[\frac{\exp\left(\frac{QV_{MD}}{KNT_{APP}}\right)}{I_d} - 1\right] \quad (1)$$

Where:

I_{PVCELL} is the incident light current, I_{OCELL} is the reverse saturation current of a diode, Q is the charge of an electron at 1.602$\times$ 10^{-19} C, K is the Boltzmann's constant at 1.38 $\times$ 10^{-23} J/K, T_{APP} is the applied temperature Kelvin, N is the diode identity factor constant and V_{PVCELL} is the voltage across the cell. Practical PV cell is represented in Figure 1.

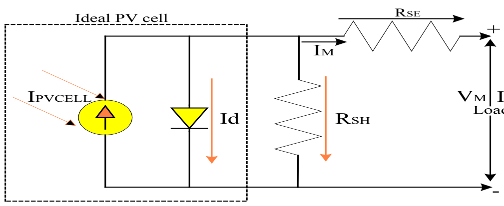

Figure 1. Practical PV cell equivalent circuit.

PV system basic equation will not represent I-V characteristics, as a practical module consists of various PV cells which require additional parametric values as series and parallel resistances (R_{SE} & R_{SH}) which are represented in Figure 1. PV module modeling is based on mathematical equation of the solar cell which is given by Eq. 2

$$I_{MD} = I_{PVCELL} - I_{OCELL}\left[exp^{\frac{Q(V_{MD}+I_{MD}R_{SE})}{N_T K N T_{APP}}} - 1\right] - \frac{V_{MD} + I_{MD}R_{SE}}{R_{SH}} \quad (2)$$

Where:

I_{MD} = PV module current in Amps

I_{PVCELL} = Photocurrent or light generated current in Amps

I_{OCELL} = Diode reverse saturation current of in Amps

Q = Electron charge in Coulombs

N = Ideality factor (taken from data sheet)

K = Boltzmann constant in J/°K

T_{APP} = Applied temperature for the PV module in Kelvin

V_{MD} = Module voltage in Volts

R_{SE} = Series resistance in ohms

R_{SH} = Parallel resistance in ohms

Current generated by light (I_{PVCELL}) depends linearly on solar radiation and also on temperature is defined by Eq. (3)

$$I_{PVCELL} = \frac{P_{APP}[I_{SCR} + T_{SCI}(T_{APP} - T_{REF})]}{P_{REF}} \quad (3)$$

Where:

P_{APP} = Applied solar irradiance in W/m^2 (applied to the module during the experiment)

P_{REF} = Reference irradiance in W/m^2 (1000 W/m^2 is taken under STC)

I_{SCR} = Short circuit current of a module

T_{SCI} = Temperature coefficient of short circuit current in A/°K

T_{APP} and T_{REF} are applied and reference temperatures in Kelvin

The calculated $I_{pv\ cell}$ values are noted in Table 1.

Table 1. The calculated Ipv cell values for different irradiance and different temperature

Irradiance in (W/m^2)	Temperature (in °C)				
	20 °C	*30 °C*	*40 °C*	*50 °C*	*60 °C*
1000	8.6615	8.6785	8.6955	8.7125	8.7295
800	6.9292	6.9428	6.9564	6.97	6.9836
500	4.3307	4.3392	4.3477	4.3562	4.3647
250	2.1653	2.1696	2.1738	2.1781	2.1823
100	0.8661	0.8678	0.8695	0.8712	0.8729
50	0.4330	0.4339	0.4347	0.4356	0.4364
10	0.0866	0.0867	0.0869	0.0871	0.0872

Modules reverse saturation current (I_{RS}) at nominal condition and reference temperature is given by Eq. (4)

$$I_{RS} = \frac{I_{SCR}}{exp^{\left(\frac{QV_{OC}}{N_T K N T_{APP}}\right)} - 1} \quad (4)$$

Where:

I_{RS} = Reverse saturation current in Amps

N_T = total no. of cells in a module

Here module voltage decreases as the applied temperature goes on increases which can be calculated by Eq. (5)

$$V_{MD} = \frac{N_T K N T_{APP}}{Q} \times \ln\left[\frac{I_{PVCELL} - I_{RS}}{I_{RS}}\right] \quad (5)$$

On the other hand saturation current (I_{SAT}) is given as

$$I_{SAT} = I_{RS} \times \left(\frac{T_{APP}}{T_{REF}}\right)^3 \times exp^{\left\{\frac{QE_{GO}}{NK}\left(\frac{1}{T_{REF}} - \frac{1}{T_{APP}}\right)\right\}} \quad (6)$$

Where:

E_{GO} = semiconductor band gap energy of the module in J/C, the shunt resistance R_{SH} is inversely proportional to leakage current and a small variation of series resistance will affect the PV output power. A PV cell will produce less than 2 watts at approximately 0.5 V and 0.7 V at open circuit condition. The cells must be connected in series and parallel combination to get required power. Array basic output current of single diode module is calculated by Eq. (7)

$$I_{ARRAY} = N_{PV}\, I_{PVCELL} - N_{PR} I_{OCELL} \left[exp^{\frac{Q}{N_T KNT_{APF}}\left(\frac{V_{MD}}{N_{SE}} + \frac{I_{MD}R_{SE}}{N_{PR}}\right)} - 1 \right] - \frac{1}{R_{SH}} \left[\frac{N_{PR} V_{MD}}{N_{SE}} + I_{MD} R_{SE} \right] \quad (7)$$

Where N_{SE} and N_{PR} are the number of solar cells connected in series and parallel. Modeling of PV array is done based on data sheet parameters of SSI-3M6-250W poly-crystalline solar module at 25° C and 1000 W/m^2. Based on above parameters PV model in Simulink is developed under standard test conditions.

3. Proposed Maximum Power Point Tracking Algorithm

Maximum power point tracking control technique is mainly used to extract maximum capable power of the PV modules with respective solar irradiance and temperature at particular instant of time by MPP tracking controller. A number of algorithms were implemented to track the MPP efficiently. Most of the existing MPPT algorithms suffer from the drawbacks of slow tracking, wrong tracking and oscillations during rapidly changing environmental conditions, which reduces the utilization efficiency.

To overcome these drawbacks an ANN based MPPT Control technique is introduced in this paper. Here it improves the performance of the system and efficiency with much better than any other conventional methods. In this technique a multi layered neural network is used. A two stage off line trained artificial neural network based MPPT is added to estimate the temperature and irradiance from the PV array voltage and current signals.

Supervised learning is implemented to nullify the error with providing the required multiplication factors to the weights at the hidden layer. This technique gives the better performance even under rapidly changing weather conditions for both steady and transient instants with reducing the training set. The boost converter, inverter are used to provide maximum output voltage to the load. Here a supervised learning feed forward trained network is introduced to overcome the non-linearities of PV array. Proposed artificial neural network based MPPT algorithm flow chart is shown in the Figure 2.

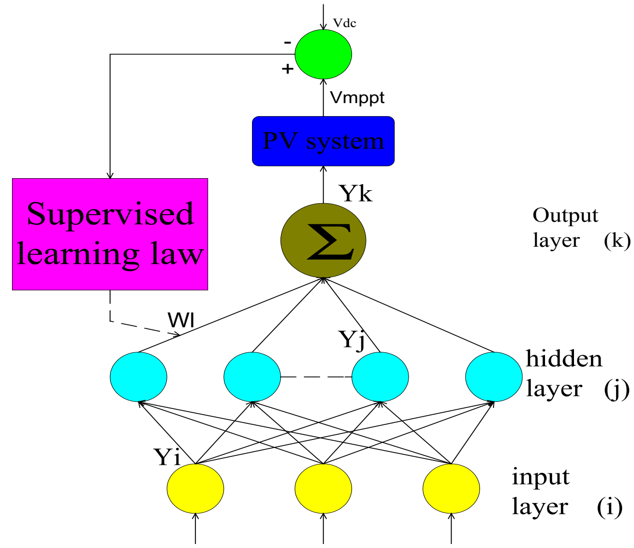

Figure 2. ANN based MPPT.

a. *Practical Outputs of Conventional MPPT Controller with Variable Irradiance at Constant Temperature*

When the irradiance is varied from 100, 250, 500, 800 and 1000 W/m^2 it is observed that the PV current and voltage will increases with irradiance levels. Due to this net PV array power also gets increases. These characteristics are observed in Figure 3.

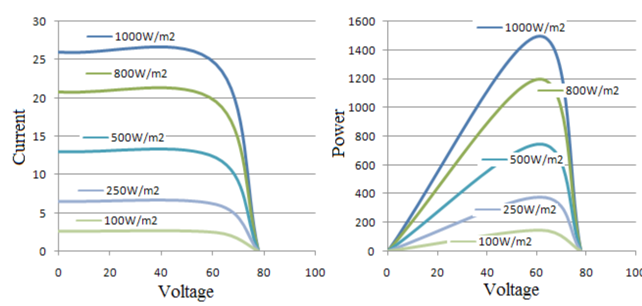

Figure 3. Practical I-V & P-V characteristics with variable irradiance and constant temperature.

b. *Practical Outputs of Conventional MPPT Controller with Variable Temperature and Constant Irradiance*

When the temperature varies from 20° C, 30° C, 40° C, 50° C and 60° C it increases the PV current marginally with drastically decrease in PV array voltage. Due to this net PV array output power reduces. These characteristics are presented in Figure 4.

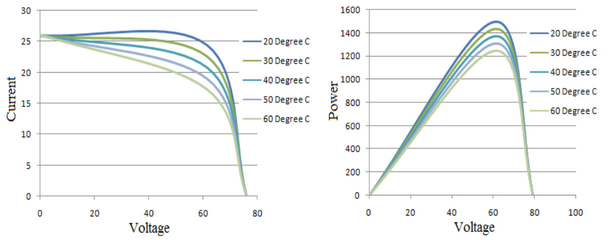

Figure 4. Practical I-V & P-V characteristics with variable temperature and constant irradiance.

c. Practical Outputs of Proposed MPPT Controller with Variable Temperature and Variable Irradiance

When both the temperature and irradiance are variable then it increases the PV module current and decreases the voltage till the temperature rise and vice-versa. Also it increases the array current and slightly increases the voltage till the irradiance rise and vice-versa. These results are illustrated in Figure 5.

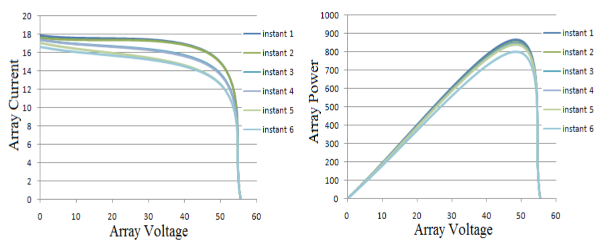

Figure 5. Practical I-V & P-V characteristics of PV array with variable temperature and variable irradiance.

4. Mathematical Modeling Asynchronous Motor Drive

The mathematical modeling of a three phase, squirrel cage asynchronous motor drive can be analyzed with stationary reference frame as

$$V_{qs} = (R_s + pL_s)I_{qs} + PL_M I_{qR}\ V_{qs} = (R_s + pL_s)I_{qs} + PL_M I_{qR} \quad (8)$$

$$V_{ds} = (R_s + pL_s)I_{ds} + PL_M I_{dR}\ V_{ds} = (R_s + pL_s)I_{ds} + PL_M I_{dR} \quad (9)$$

$$0 = pL_M I_{qs} - \omega_R L_M I_{ds} + (R_R + pL_R)i_{qR} - \omega_R L_R i_{dR} \quad (10)$$

$$0 = \omega_R L_M i_{qs} + pL_M i_{ds} + \omega_R L_R i_{qR} + (R_R + pL_R)i_{dR} \quad (11)$$

Where $\omega_R = \frac{d\theta}{dt}$, $p = \frac{d}{dt}$

Suffixes S and R represents stator and rotor respectively. V_{ds} and V_{qS} are d-q axis voltages of respectively, i_{ds}, i_{qs} and i_{dR}, i_{qR} are d-q axis stator and rotor currents respectively. R_S and R_R are stator and rotor per phase resistances. L_S, L_R are stator and rotor self inductances and L_M is mutual inductance. Flux linkages of stator and rotor can be expressed as

$$\lambda_{qs} = L_s i_{qs} + L_M i_{qR} \quad (12)$$

$$\lambda_{ds} = L_s i_{ds} + L_M i_{dR} \quad (13)$$

$$\lambda_{qR} = L_R i_{qR} + L_M i_{qs} \quad (14)$$

$$\lambda_{dR} = L_R i_{dR} + L_M i_{ds} \quad (15)$$

From the above Equations (8)-(11), squirrel cage asynchronous motor can be analyzed by the following equations in stator reference frame as

$$\begin{bmatrix} V_{qS} \\ V_{dS} \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} R_S + pL_S & 0 & pL_M & 0 \\ 0 & R_S + pL_S & 0 & pL_M \\ pL_M & -\omega_R L_R & R_R + pL_R & -\omega_R L_R \\ \omega_R L_M & pL_M & \omega_R L_R & R_R + pL_R \end{bmatrix} \begin{bmatrix} i_{qS} \\ i_{dS} \\ i_{qR} \\ i_{dR} \end{bmatrix} \quad (16)$$

The electromagnetic torque Te of the induction motor is given by

$$T_e = \frac{3}{2}\left(\frac{p}{2}\right)(\lambda_{qR} i_{dR} - \lambda_{dR} i_{qR}) \quad (17)$$

From the dynamic representation of an asynchronous motor, the flux of the rotor is aligned along with the d-axis, then the q-axis rotor flux $\lambda_{qR} = 0$. So from the equations (14) and (17), it is described in the previous section and putting $\lambda_{qR} = 0$, then the the vector control electromagnetic torque of the motor can be expressed as

$$T_e = \frac{3}{2}\left(\frac{p}{2}\right)\frac{L_M}{L_R}(\lambda_{dR} i_{qs}) \quad (18)$$

If flux linkage of the rotor λ_{dR} is not disturbed, then the torque can be controlled independently by adjusting the stator q- component current i_{qS}. As the rotor flux aligned on d-axis, then it leads $\lambda_{qR} = 0$ and $\lambda_{dR} = \lambda_R$, then

$$\omega_{sl} = \frac{L_M R_R}{\lambda_R L_R} i_{qs} \quad (19)$$

5. Proposed SVM Technique for Two Level Inverter

In this the space vector modulation technique is implemented with the two level inverter for the solar array, which produces the DC supply. SVM basic working principle and switching sequence is given in order to get symmetrical pulses for balancing of the voltages. This technique is used to control the output voltage of the inverter with the ANN based MPPT controller. In the proposed SVM technique, the d-axis and q-axis voltages are converted into instantaneous three-phase reference voltages. Then the imaginary switching time periods are proportional to the instantaneous values of reference phase voltages. Which are defined as

$$T_{V1}=\left(\frac{T_S}{V_{DC}}\right)V^{*}_{V1},\; T_{W1}=\left(\frac{T_S}{V_{DC}}\right)V^{*}_{W1}\; T_{W1}=\left(\frac{T_S}{V_{DC}}\right)V^{*}_{W1} \tag{20}$$

Where T_S and V_{DS} are the interval sampling time and dc link voltages respectively. Here the sampling frequency is the twice that of the carrier frequency.

Then the imaginary switching times of maximum (MAXI), middle (MID) and minimum (MINI) can be in each sampling interval using Equations (21)-(23).

$$T_{MAXI} = MAXI(T_{U1}, T_{V1}, T_{W} \tag{21}$$

$$T_{MINI} = MINI(T_{U1}, T_{V1}, T_{W1}) \tag{22}$$

$$T_{MID} = MID(T_{U1}, T_{V1}, T_{W1}) \tag{23}$$

The voltage active vector switching times T_1 and T_2 are calculated as

$$T_1 = T_{MAXI} - T_{MID} \text{ and}$$
$$T_2 = T_{MID} - T_{MINI} \tag{24}$$

The switching time of the zero voltage vector is calculated as

$$T_Z = T_S - T_1 - T_2 \tag{25}$$

The state time zero will be shared between two zero states as T_0 for V_0 and T_7 for V_7 respectively, and that can be given as

$$T_0 = K_0 T_Z \tag{26}$$

$$T_7 = (1 - K_0)T_Z \tag{27}$$

The various SVM techniques can be generated by changing K_0 between 0 and 1. However, in this SVM technique, the zero voltage vector time is distributed equally among V_0 and V_7. Hence, here K_0 is chosen as 0.5 to obtain the SVM control technique as shown in Figure 6.

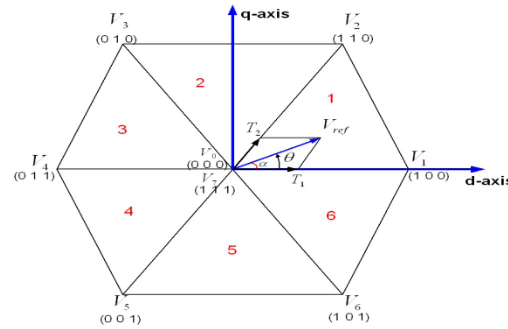

Figure 6. Space vector diagram.

6. Proposed MPPT System with Dc-Dc Converter, Inverter and ASM Drive

The below system represents the proposed system structure with DC-DC converter. In this, PV array contains 6 PV modules with 250 Watts each; these modules are connected in the combination of series and parallel to yield better output voltage and current. The proposed artificial neural network (ANN) based MPPT controller extracts the maximum power from solar array at three various conditions.

Case I: at variable irradiance and constant temperature.

Case II: at variable temperature and constant irradiance and,

Case III: at variable temperature and variable irradiance which is a new technique when compared to the other conventional methods.

These individual case outputs are presented in section 3 and 7. The proposed system structure with the asynchronous motor drive is presented in Figure 7.

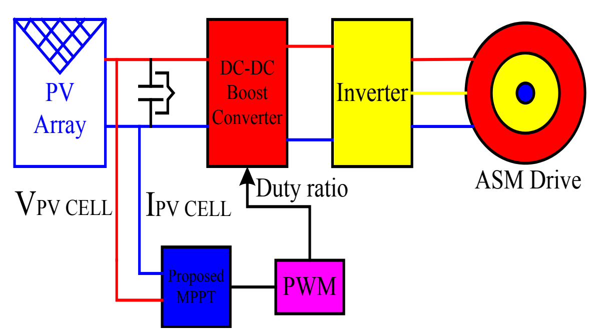

Figure 7. Proposed MPPT system with DC-DC converter and asynchronous motor drive.

The point of operation of the solar array is adjusted by changing the duty cycle. DC-DC boost converter boosts the PV array output voltage and also increases the maximum utilization of PV array by operating at MPP. Boost converter increases the array output voltage up to 400 Volts with the help of SVM based inverter.

The minimum inductor value (L_{MIN}) is calculated from Equation (28) to ensure the continuous inductor current.

$$L_{MIN} = \left(\frac{V_0(1-D)^2 \times D}{2}\right) \times f_S \times I_{AVG} \tag{28}$$

Where V_0 is DC voltage, D is duty ratio, f_S is switching frequency of the converter, I_{AVG} is average output current. The minimum capacitance value (C_{MIN}) can be calculated using Equation (29).

$$C_{MIN} = \frac{V_0 \times D}{R \times \Delta V_0 \times f_S} \tag{29}$$

The switching frequency selection is trade-off between switching losses, cost of switch and the converter efficiency.

7. Results and Discussion

The proposed model has been implemented with Matlab-simulink. The input to the module is temperature and solar irradiance. At Standard Test Conditions (STC) containing 60 cells to produce 250 Watt power and such 6 modules are arranged to form solar array. From simulation results we got the array generated open circuit voltage is 75.96 Volts with short circuit current about 26.01 Amps and the maximum power obtained at MPP is 1500 Watts. These results are observed in Figure 8.

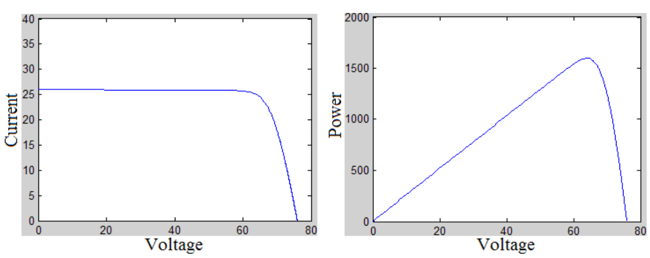

Figure 8. I-V & P-V characteristics obtained from PV array.

Practical array output power values are tabulated in Table 2.

Table 2. Practical PV array output power at different instants during partially cloudy day

Time in (am/pm)	Temperature in (^{0}C)	Array Power in (Watts)
08.00	30.75	188.70
09.06	33.35	642.94
10.00	38.25	725.62
11.00	39.55	839.61
12.00	40.50	853.60
12.10	40.68	866.36
13.00	41.35	801.78
14.00	40.08	662.70
15.00	38.42	611.00
16.00	37.32	453.12
16.30	37.06	381.51

a. *Simulation Results of Asynchronous Motor Drive with Inverter*

Simulation results are obtained with the reference speed of 1400 RPM and switching frequency of 5 KHz. The behavior of the motor parameters such as stator phase current, torque and speed are illustrated in the below results. Here the motor drive is being fed with 400 Volts supply with the help of boost converter and inverter. The inverter output voltages are presented in Figure 9.

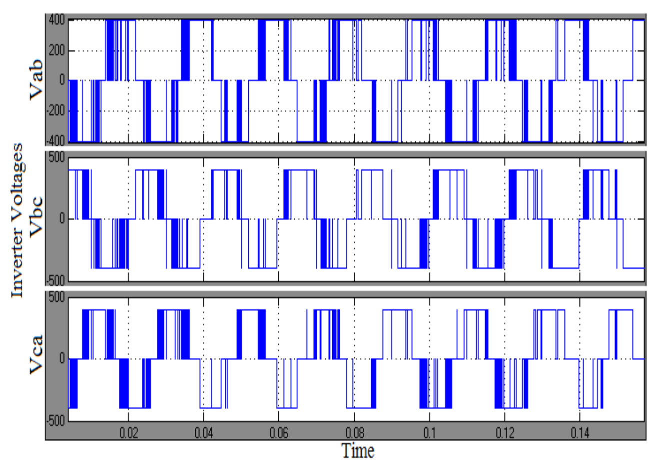

Figure 9. Inverter output voltages.

b. *Simulation Results of Asynchronous Motor Drive* at starting

For the asynchronous motor drive the maximum current and the content of the ripple in the torque is reduced during starting to reach the steady state earlier. With the proposed MPPT the maximum torque, stator phase current and the speed are obtained as 12.28 N-m, 7.596 Amps and 1400 RPM respectively. It is noted that the content of the ripple in the torque is 0.29 with lot of reduction compared to the other existed methods. Due to this better speed response is obtained. These results are presented in Figure 10-12.

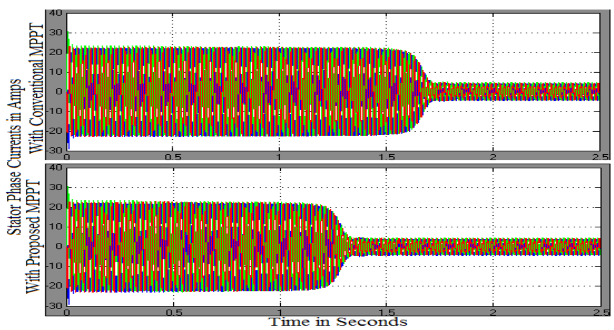

Figure 10. Stator phase current responses with conventional and proposed MPPT controller at starting.

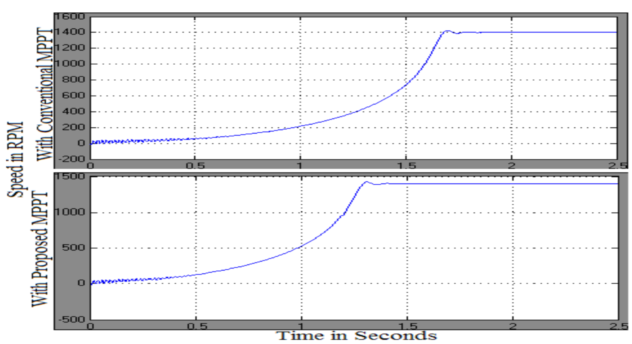

Figure 11. Speed responses with conventional and proposed MPPT controller at starting.

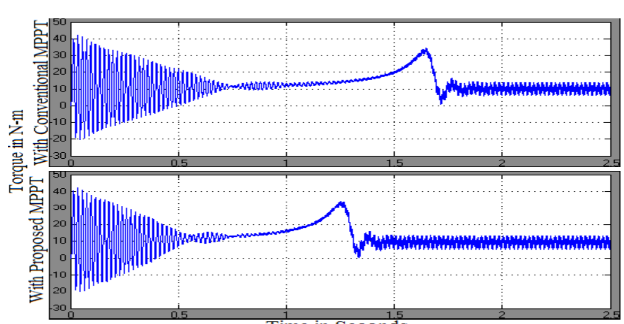

Figure 12. Torque responses with conventional and proposed MPPT controller at starting.

c. Simulation Results of Asynchronous Motor Drive at steady state condition

Here torque ripple with the proposed MPPT is reduced a lot i.e. the torque ripple content with the conventional and proposed MPPT are 0.35 and 0.05 respectively. The better speed response is obtained with the proposed ANN based MPPT controller. The responses of the stator phase current, torque and speed at steady state with conventional and proposed MPPT are observed in Figure 13-14.

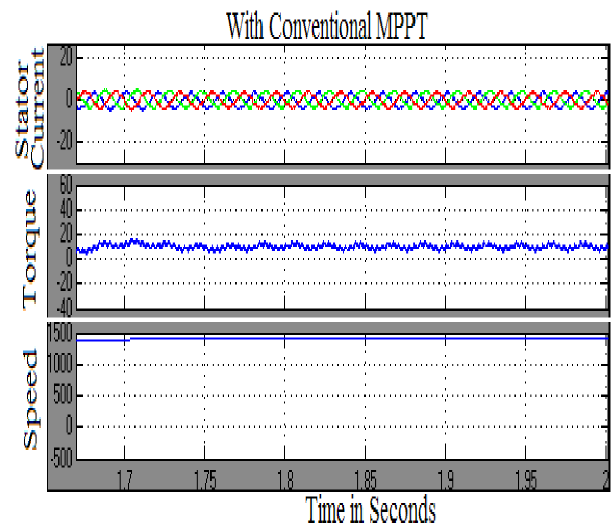

Figure 13. Stator phase current, torque and speed responses with the conventional MPPT controller at steady state.

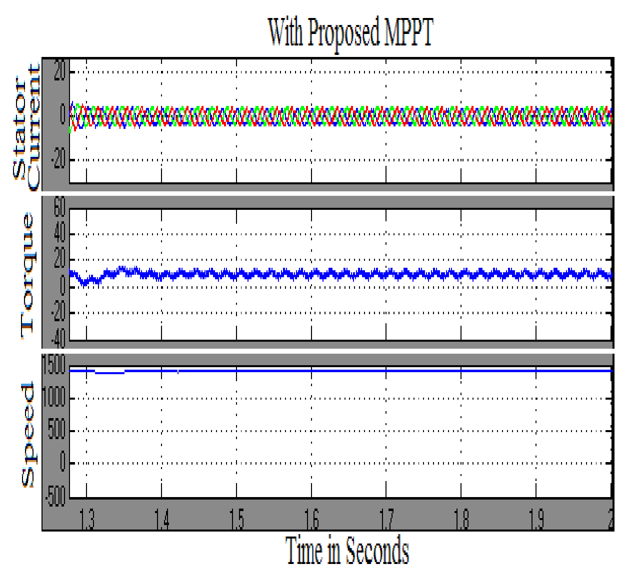

Figure 14. Stator phase current, torque and speed responses with the proposed MPPT controller at steady state.

d. Simulation Results of Asynchronous Motor Drive at transients with step change in load

Here the content of ripple in the current and torque are reduced by the proposed MPPT. Also the speed decrement is little less with the proposed MPPT during the load change. The transient responses during the step change in load torque 8 N-m is applied at 0.7 sec and removed at 0.9 sec are available in Figure 15-17.

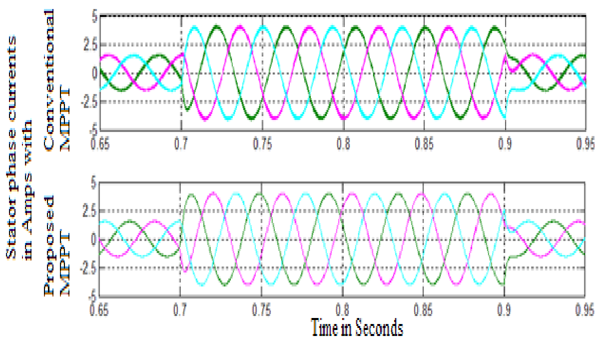

Figure 15. Stator phase current responses with conventional and proposed MPPT controllers at transients with step change in load.

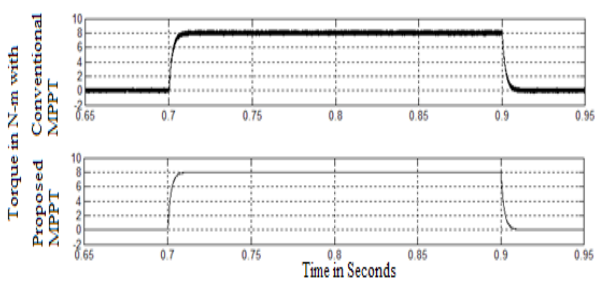

Figure 16. Torque responses with conventional and proposed MPPT controllers at transients with step change in load.

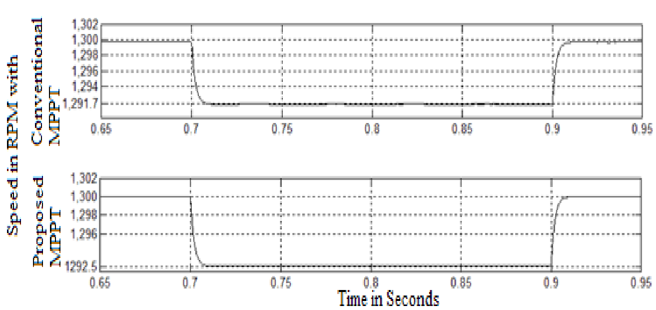

Figure 17. Speed responses with conventional and proposed MPPT controllers at transients with step change in load.

8. Conclusion

The PV array model with the proposed artificial neural network (ANN) based MPPT control technique is tested. From this the behavior of the asynchronous motor drive is analyzed with comparing both conventional and proposed ANN MPPT controller results. Also the behavior of the proposed ANN MPPT is observed with practical validations during a partially cloudy day. PV system with DC-DC boost converter and space vector modulation based technique inverter enhances the system performance with improving the power quality even under abnormal weather conditions. The ripple contents in the torque and stator phase currents are reduced a lot with the proposed ANN based MPPT. Here the early steady state response of the motor drive is reached along with attaining of better speed response. Thus with the proposed ANN based MPPT controller, the utilization and efficiency of the system is improved much.

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