

BLDC Motor Using Interleaved Boost Converter cum Solar PV

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Abstract- BLDC motor which is utilized for commercial purposes has been dynamically supplanting the traditional DC drives in different applications, for example, electrical vehicles and mechanical mechanization. The Solar PV exhibit is organized with the true objective that the power at assessed DC voltage is given to the BLDC motor under standard test condition and switch used for interleaved converter is practiced which results in higher capability improvement of this converter. A Photovoltaic (PV) array under uniform irradiance shows a present voltage trademark with a novel point called the most extraordinary power point (MPP) where the display produces most prominent yield control. The interleaved innovation technique furnishes prevalent execution with low voltage and low failures. The electronically commutated BLDC motor is being used with the voltage source inverter (VSI) employed at fundamental repeat trading thus avoiding the high repeat trading setbacks achieving a high viability of the frame word. In Mat lab/Simulink the exhibitions of the proposed drive are proposed which improved the productivity and power factor.

Indexed Terms- solar,pv(photovoltaic),MPPT(Maximum Power Point tracking),interleaved support converter,BLDC (Brushless DC Motor)

I. INTRODUCTION

Presently, sun powered PV is considered as most economic source of creation of power. PV produce more imperativeness than that of their foundation .PV control panel is more expensive than various resources at any rate governments have been propelling it with sponsorships or feed ,expecting the progression of the advancement so within the near future it will end up being very forceful. By growing

the capability of the power plants so the power made additions is a key point as it will construct the profit which will decrease consequently the cost of the power made and hereafter it will approach the cost of the power which are conveyed from some various sources. BLDC motor are the effective motor contrasted with acceptance since it has great execution with longer life [1], low recompense and a low copper misfortune. An engine controller is utilized that changes over DC to AC. This plan is contrasted and different motors and less perplexing than that of brushed motors since it murders the disarray of trading power from outside motor to the turning rotor.

Boost converter and buck boost converter has been arranged in the current system. The framework has a low execution when contrasted with the interleaved boost converter. Power required and high sounds are considered as the real disadvantage of this system. These downsides are overwhelmed by interleaved support converters. At the point when power requests expands, a solitary power organize in converter isn't adequate for looking after interest. Contrasting it with the single-support converter, the IBC approach gives higher effectiveness favourable circumstances in both diagnostically and observationally. A regular Boost converter is the one which is a kind of DC-DC converter which is utilized to venture up the information DC voltage. By changing the obligation proportion of exchanging of the transistor an ideal dc yield voltage is gotten. An Interleaved Boost converter is essentially is structured parallel association of at least two traditional lift converters. Deciding the quantity of parallel associations the quantity of periods of the Interleaved Boost converter. An Interleaved Boost converter circuit offers a superior current and voltage also decrease, improved power factor, and so on. It is basic to pursue the Maximum Power Point in all regards

absolutely under each and every believable condition so the best available power is constantly used. MPPT computations are fundamental in PV applications in light of the way that the MPP of a sun situated board changes with the enlightenment and temperature so the usage of MPPT figuring's is required in order to get the best power from a sun based bunch [2]. There are 19 particular MPPT estimations can be found .from these techniques the P&O counts are the for the most part used one [3].

The advantages of the interleaved converter are according to the accompanying: I) the converter is depicted by an uninformed current swell and low conduction disasters II) It is sensible for high impact applications. III) The broad high development up voltage gain that feasible power source structures require. IV) The essential switch voltage stress of the converter is lower than that of the yield voltage. V) Low cost and high viability is practiced by the low voltage rating of the power trading contraptions.

II. PROPOSED SYSTEM

A. Solar Photo Voltaic

A worldwide temperature boost and vitality energy policies are considered as the hotly debated issues on the international agenda over the most recent couple of years. Many created nations are attempting their most to decrease their ozone depleting substance discharges. Photo voltaic (PV) has a significant task to carry out in nature because of the way that it is additionally green source. The main discharges that are related with power age are those from the creation of its parts. After the establishment of parts they create power from the sun powered light without transmitting ozone depleting substances for their lifetime which would associate with 25 years .Photo voltaic panels will produce more vitality than the vitality required for their assembling . They can likewise be introduced in spots with no other utilize like deserts or they can create power for some remote areas where there is no power organize. This kind of establishments are known as off grid and once in a while they are the most affordable choice to give power in remote regions .PV generation is more costly than different assets. Governments are advancing it with endowments or feed in duties expecting the advancement of the innovation so that

sooner rather than later it will wind up focused .Increasing the productivity of the PV plants the power created increments is considered as a key angle as it will build the wages diminishing subsequently the expense of the power created so it will approach the expense of the power delivered from different sources

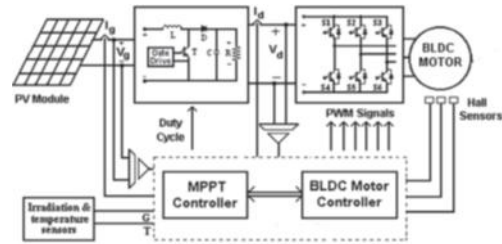


Fig.1 Proposed block diagram

B. Maximum Power Point Tracking (MPPT)

MPPT algorithm are used in PV applications in light of the fact that the MPP of a solar differs with the illumination and temperature so the utilization of MPPT calculations is required so as to get the most extreme power from a sun based exhibit [2]. Over the previous decades numerous techniques to discover the MPPT have been created and distributed. These MPPT systems vary in numerous from one another like required sensors, intricacy, cost ,adequacy, combination speed , right following when light or temperature change equipment required for the usage or prevalence among others .There are 19 different MPPT calculations can be found .from these methods the P&O algorithm are the most usually utilized one [3] . The fundamental favourable position of his procedure is a simple and have low cost.

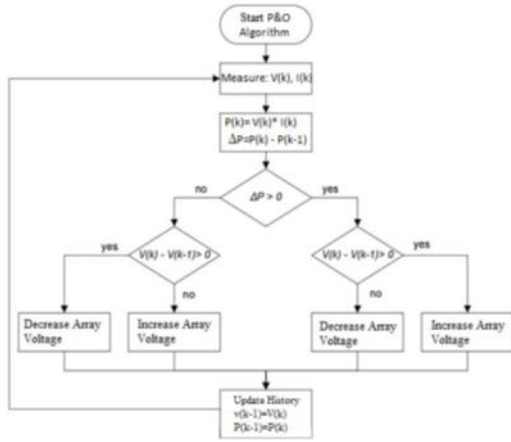


Fig.2 Flowchart of P&O algorithm

The Perturb & Observe algorithm describes that when the operating voltage of the panel is perturbed by little increment, and the resulting change in power P is positive, then we are going in the direction of MPP and it is perturbing in the same direction. When power P is negative, going away from the direction of MPP and the sign of perturbing direction will be changed.

C. Inter Leaved Boost Converter

As by virtue of the standard Boost converter, swell current is seen as undulated as a result of rise and fall of the inductor current. By using IBC this issue can be abstained from.

An Interleaved Boost converter is the parallel relationship of at any rate 2 Boost converters [4], called the stages. Interleaved control .For the circumstance of conventional Boost converter, swell is accessible in the data current as a result of rise and fall of the inductor current. This issue can be cleared out by using Interleaved Boost converter. This Interleaved Boost converter is considered as the parallel relationship of many Boost converters [5] least of two, which are in like manner called the stages. Interleaved control of such a topology with n number of stages has stage moving by $2\pi/n$ or T/n where T is the season of trading time. The fundamentally considered focal points of Interleaved Boost converter while appearing differently in relation to the Boost converter are diminished current and voltage swell, improved PF, better profitability.

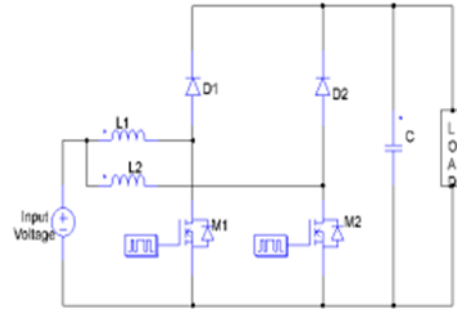


Fig .3.Circuit diagram of IBC Converter

The waveforms for voltages and current are showed up in Fig. 6 for steady state current, tolerating that the current is rising or falling directly.

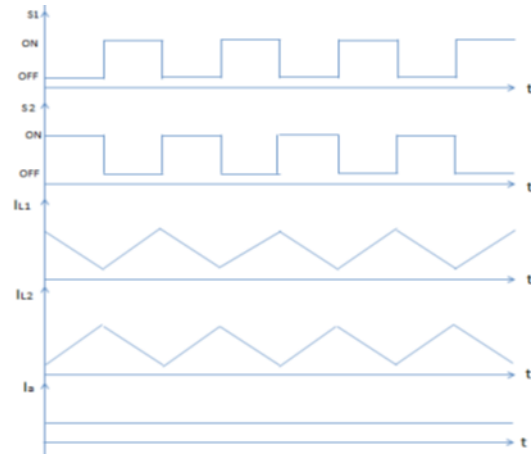


Fig .4.Voltage and current waveforms of IBC.

D. Three Phase Voltage Source Inverter

The full-connect inverter is helpful for unfurling the sinusoidally adjusted dc current packs into air conditioning at the correct snapshot of the lattice voltage. Consequently, the switches of the inverter are being worked at the network recurrence, the misfortunes amid exchanging are unimportant. Just misfortunes in conduction are concerned. Consequently, the scaffold use thyristor and furthermore transistor switches for its lower cost operation. The low-pass channel after the IGBT inverter has been in charge of providing an all the current to the lattice with low THD by taking out the high current waveforms.

E. BLDC Motor

BLDC motor are mostly utilized in mechanical applications because of its unwavering quality, low

support and low weakness. It has been logically supplanting traditional DC drives in different applications, for example, electrical vehicles and modern computerization. The BL30 EB is an amazingly reduced brushless DC engine with coordinated drive gadgets. This engine is an external rotor engine giving a hearty bearing framework equipped for dealing with high side burdens. Great segments guarantee a working existence of 20000 hours as a minimum [8]. The torque of about 30 mNm at a consistent speed of 3500 RPM makes this motor perfect for little film and peristaltic siphons, laser scanners, top of the line fan and medicinal applications. The BLDC motor is chosen in light of its benefits valuable for the advancement of reasonable water siphoning framework. This electronically commutated Brushless DC engine is provided with a (VSI which is worked by crucial recurrence exchanging bringing about low exchanging

III. SIMULATION RESULT

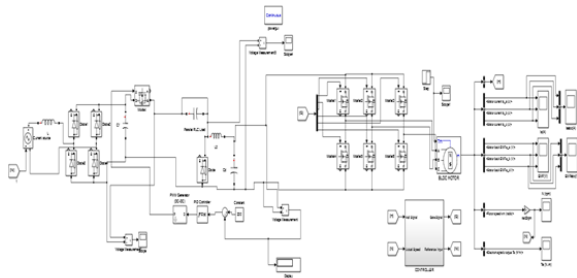


Fig .5.Simulation figure of BLDC motor using IBC

A. BLDC Motor Output

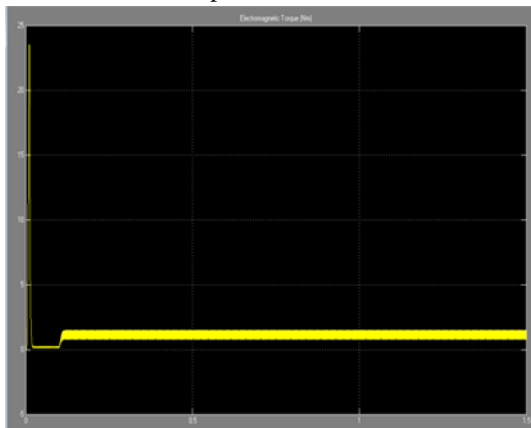


Fig. 6 .BLDC motor output

B. Rotor Speed

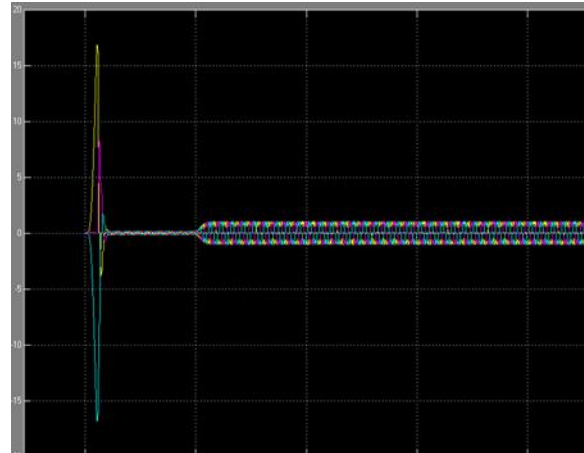


Fig .7. Rotor speed of BLDC motor

C. Electromagnetic Torque

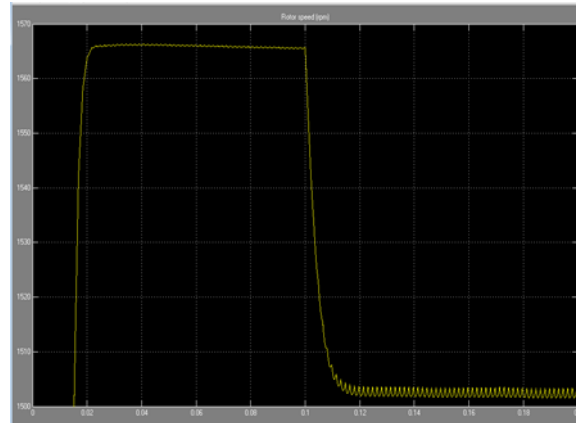


Fig .8.Simulation of Electromagnetic Torque

IV. CONCLUSION

This paper introduces the recreation of interleaved boost converter for driving a BLDC motor for low power applications. With this proposed converter the power quality can be enhanced at the air conditioner mains. The speed control of the BLDC engine can be done by differing the DC transport voltage level. Electronic substitution will prompts the decrease of exchanging worry in the inverter. Speed can be constrained by the variety in DC link voltage. The converter performed critically among the on the grounds that the system required an adequately high advance up transformation. This interleaved technique appealingly coupled to a voltage duplicated circuit which gives a voltage increment higher than that of customary boost topology and this converter has low voltage stress over the switches impartial

voltage changing between yield capacitors, low data current swell, and the components which are operated on magnetic properties also has very low stress.

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