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RESEARCH ARTICLE OPEN ACCESS

Harmonic Current Reduction by Using the Super Lift Boost Converter for Two Stage Single Phase Inverter

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Abstract:

The output power pulsate twice the line frequency on the DC-DC converter. It generates the harmonic current .These harmonic current affect the MPPT and the overall conversion efficiency. The voltage loop gain is improved by using the active damping scheme. In this proposed method the super-lift boost converter is used because this converter has 2 times fast performance compared to the DC-DC converter and it also boost the input voltage. The super lift boost converter most widely used for the voltage loop gain. This process is higher than the cascade boost converter. There is no conversion loss during the voltage conversion process. And this paper was experimentally verified.

Introduction:

The super-lift boost converter widely used for boost the voltage. The voltage loop gain can be increased by geometric progression. In this paper the software output is verified. The fleshing fly back technique is used in the matlab. The working of the method is the input is given the bridge is there, and the next of chopper. The chopper is the electronic switch that is used to interrupt one signal under the control of another. The output of the chopper is given into the inverter it will be in the form of AC. Then the output is given into the load the LED light glow.

In recent years, various approaches have been proposed to suppress the HC the front-end of the converter. Passive components, including capacitors and inductors, are usually used to buffer the pulsating power. The simplest way is to introduce electrolytic capacitors connected in parallel with the intermediate dc bus. The 2*f*o is added between the battery and the input filter capacitor, producing an infinite impedance at 2*f*o, and thus forcing almost all of the HC to flow through the input filter capacitor. Similarly, an *LC* series resonant branch with the characteristic frequency of 2*f*o can be connected in parallel with the intermediate dc bus to provide a zero-impedance path for the HC. However, since the frequency of HC, which is 2fo, is very low, the size and weight of the resonant components are very large and the power density of overall system is reduced. The hardware is implemented using the Pic-Microcontroller “Pic 16F84A”. The merits of

the Pic- microcontroller is that the instruction set of this controller are fewer than the usual microcontroller. Unlike Conventional processors, which are generally complex, instruction set computer (CISC) type, Pic microcontroller is a RISC processor.

The merits of RISC processor against CISC processor are:

i) RISC instructions are simpler and consequently operate faster.

ii) A RISC processor takes a single cycle for each instruction, while CISC processor requires multiple clocks per instruction (typically, at least three cycles of execution time for the simplest instruction and 12 to 24 clock cycles for more complex instruction), which makes decoding a tought task.

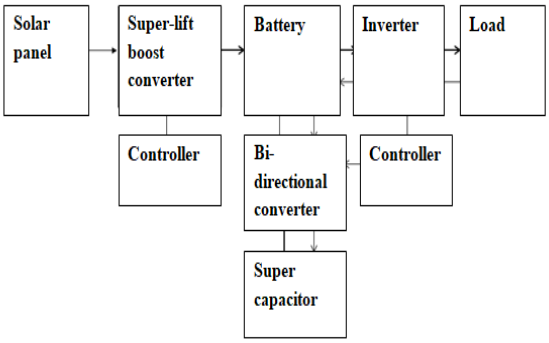
iii) The control unit in a CISC is always implemented by a micro-code, which is much slower than the hardware implemented in RISC.

The idea of using the PIC microcontroller is because:

1) To employ the frequently used instructions as the instruction set while using a few instructions to achieve the same function performed by a much more complex instruction in a CISC.

2) The RISC itself has a large number of general purpose registers, largely reduced the frequency of the most time-consuming memory access.

BLOCK DIAGRAM



HARDWARE IMPLEMENTATION

For the hardware implementation we use different components. They are listed below as

1. PIC Microcontroller 16F84A.
2. Voltage Regulators
   a). 7812 voltage regulator
   b). 7805 voltage regulator
3. IC IR2110 for the amplification of the pulses given by PIC16F84A.

POWER SUPPLY CIRCUIT:

Power supply is a device that supply electric power from source to load using electronic circuits. Typical application of the power

supplies is to convert AC input power to regulated voltage required for electronic equipments.

A small variation if necessary removed by a regulator circuit which gives out a very steady voltage. This regulator also removes any variations in the DC output voltage caused by AC main voltage changing in its value. Regulators are available in the form of Integrated Circuits only it will have three connections

MOSFET

The MOSFET or Metal Oxide Semiconductor Field Effect Transistors by the far most common field effect transistor in both digital and analog circuits. The MOSFET composed to a channel of n-type or p-type semiconducting materials and it called as NMOSFET or a PMOSFET. Unfortunately, many semiconductors have better electrical properties than silicon materials such as gallium arsenide. It do not form good gate oxides and thus are not suitable for MOSFET.

The gate terminal is a layer of poly silicon (polycrystalline silicon) or aluminous placed over a channel, but separated from the channel by a thin layer of insulating silicon dioxide.

A Drain and source connections are made to higher conduction high doped regions. The metal gate is electrically isolated from the P-type substrate by a layer of non-conducting silicon oxide (SiO2).

5.1.3 Features of power MOSFET

Power MOSFET has lower switching losses but its on-resistance and

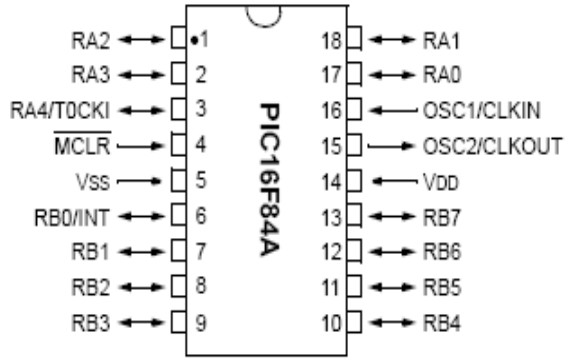
conduction losses are more.

MOSFET is a voltage-controlled device.

MOSFET has positive temperature co-efficient for resistance. This makes parallel operation of MOSFET easy. If a MOSFET shares increased current initially, it heats up faster its resistance rises and this increased resistance causes this current to shift to other devices in parallel.

In MOSFET secondary break down does not occur, because it has positive temperature co-efficient.

Pin diagram of PIC controller



The PIC16F84A belongs to the mid-range family of the PIC microcontroller devices. The program memory contains 1K words, which translates to 1024 instructions, since each 14-bit program memory word is the same width as each device instruction. The data memory (RAM) contains 68 bytes. Data EEPROM is 64 bytes. There are also 13 I/O pins that are user-configured on a pin-to-pin basis. Some pins are multiplexed with other device functions. These functions include:

- External interrupt
- Change on PORTB interrupts
- Timer0 clock input

The data memory can further be broken down into the general purpose RAM and the Special Function Registers (SFRs). The operations of the SFRs that control the "core" are described here. The 64 bytes of data EEPROM memory have the address range 0h-3Fh.

Special Features of PIC16F84A

What set a microcontroller apart from other processors are special circuits to deal with the needs of real time applications. The PIC16F84A has a host of such features intended to maximize system reliability, minimize cost through elimination of external components, provide power saving operating modes and offer code protection

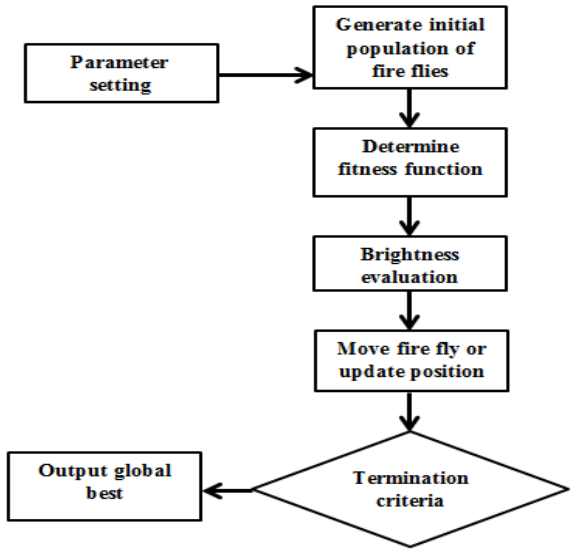
IR 2110 – HIGH AND LOW SIDE DRIVER:

Some of the features of IR 2110 are:

- Floating channel designed for bootstrap operation.
- Gate drives supply range from 10 to 20V.
- Under voltage lockout for both channels.
- 3.3V logic compatible.

FIRE FLY ALGORIYHM (FA)

This algorithm is inspired by the flashing behavior of fireflies to attract other fireflies for mating purpose. The statistical analysis of the comparison clearly indicates that FA is potentially more powerful in finding global optima with least computing time.

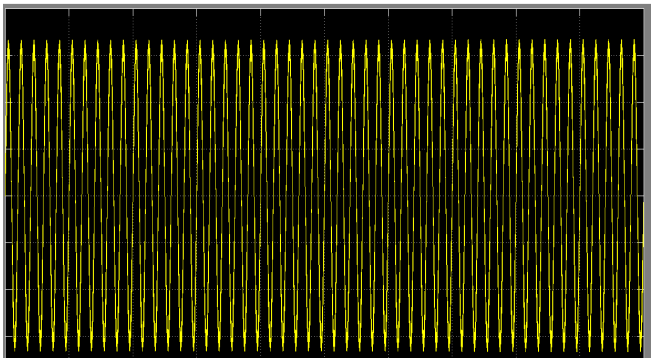


1. The attractiveness between two fireflies is proportional to relative brightness and the less bright one will move toward the more brighter one. If there is no brighter one in a firefly colony, each one will move randomly.
2. The brightness of a firefly is affected or determined by the landscape of the objective function

Simulation output

Fire Fly Algorithm gives more attractiveness and reduced complexity, less oscillation in amplitudes of voltage, current, power.

MPPT methods based on fire fly (FA) have been proposed to track the global maximum point (GMP).



The advantage of using the proposed system is that the search space for the FA is reduced, and hence, the time that is required for convergence can be greatly improved.

CONCLUSION

Output power pulsate twice the line frequency it generate the harmonic current on the output side by using the superlift boost converter reduce the harmonics compared to the DC-DC converter .it has fast performance and it take less time to the reduction process. . Very high output voltage is easily obtained. It is about 90%. These converters will be applied in industrial applications and renewable energy systems with very high output voltage.

REFERENCE

K. Antoniewicz and K. Rafal, K "Model predictive current control method for four-leg three-level converter operating as shunt active power filter and grid connected inverter," in Bulletin of the Polish Academy of Sciences Technical Sciences, vol. 65, no. 5, pp. 601-607, Oct 2017

