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BRIDGELESS BASED ONLINE TRANSFORMERS UPS POWER SUPPLY SYSTEM FOR ENERGY STORAGE APPLICATIONS

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ABSTRACT

On-line Uninterruptible Power Supplies (UPS) are widely used to provide highly reliable and quality power to critical loads using transformerless power supply in all grid conditions. This paper Proposed for online transformerless uninterruptable supply for low power applications using battery.The bridgeless rectifier reduces input current harmonics and switching losses.The resonant converter achieves ZVS/ZCS operation results in very less switching losses.Due to this converters low energy battery charger/discharger are enough to maintain UPS.

KEYWORDS

DSPIC30F2010 controller, transformer less uninterruptable supply, bridgeless Sepic converter

1. INTRODUCTION

An uninterruptible power supply, commonly called a UPS is a device that has the ability to supplies the unterruptible supply to the load.It takes the 12v battery supply as ainput sorce and supplied to the inverter circuitry.it produces an AC voltage, that will sent to the load. This particular UPS is designed for domestic load such as personal computer and hence only a minimal power rate is generated by the UPS. Many believe that because an inverter is operating from a conventional 12V battery and it cannot deliver as much

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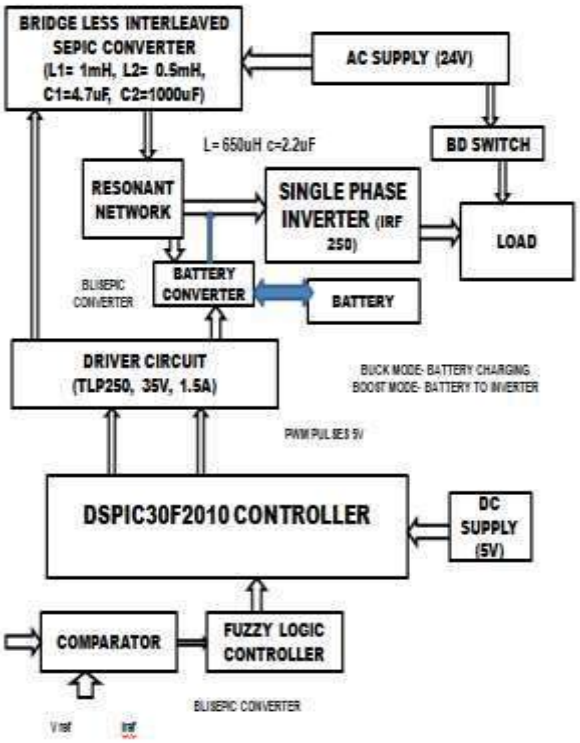
output as a normal mains power outlet, its relatively safe. This is not generally true. Even a low power inverter rated for 60watts has an output which is potentially fatal if you become its load. Such an inverter can have aapproximate output of 350mA at 230V. Generally, uninterrupted power supply (UPS) can be classified by source or method of itsfunctionality. By Source: Here we have taken a voltage source (DC) for its operation or takinga current source (DC). The current source meanwhile is used for very high power rating devices hence this design is a voltage source UPS. Amongst others here is the single tracked and dual-tract UPS. The single-tract UPS. [8] discussed about principles of Semiconductors which forms the basis of Electronic Devices and Components.



Eventhough we provide highly quality solutions to the system ,the existing system doesn't achieve the high efficiency. So that we using corresponding technologies of interleaved sepicconverters ,resonant networks and buck/boost batteries to achieve the corresponding results.

2. DESCRIPTION :

Online transformerless ups system gives continuous power flow even power failure as well as it doesn't takes tripping circuit time for enabling. The bridgeless configuration takes action without using the transformers. The battery converters do a charging/discharging smoothly. The microcontroller gives the input and controlling pulses to the power electronic devices.

3. PROPOSED METHODOLOGY

3.1. BLOCK OF THE PROPOSED SYSTEM

transformers UPS power supply system is given above.

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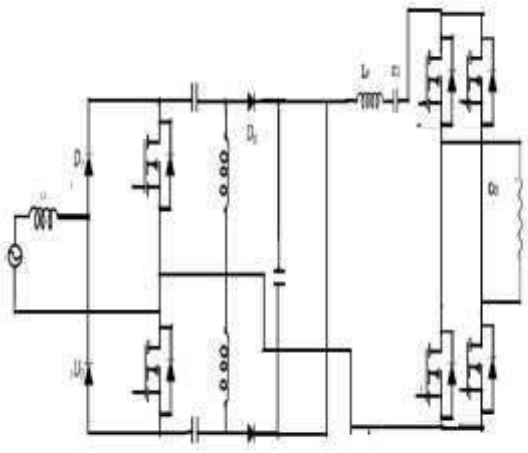
4. CIRCUIT DIAGRAM

Duringnormal time the required ac supplyis directly fed to the load,as well as ac supply is fed to the bridgeless interleaved sepic converter to convert ac into dc to store the battery converter.when the ac source isabsent the stored energy discharging and fed into inverter to use for required linear and non linearloads. The resonant networks used to improves the performance and reduces the THD in the system network.



The entire power circuits get input pulse and controlling signals through the microcontroller. The microcontroller will ensures the errorless performance of the system

5. INTERLEAVED SEPIC CONVERTER

Single-ended primary inductor converter (SEPIC) is a derived dc-dc converter whose output voltage can be more, less, or equal to the input voltage based on the duty ratio. That is the sepic can provide buck boost operation had been carried out without polarity reversal. Interleaving technology has been used in the proposed SEPIC in order to reduce the filter size further, and gain peak efficiency. In the interleaved configuration, we parallel SEPIC cells, and artificially shift the phase of the gate signals by $2\pi/n$, some ripple can be entirely eliminated due to the phase shift and the RMScurrent of output capacitor is reduced. Therefore, the quantity of output capacitor and EMI filter can be highly reduced.

6. FUZZY LOGIC CONTROLLER:

Fuzzy logic has rapidly become one of the most successful of today's technology for developing sophisticated control system. With it aid complex requirement so may be implemented in amazingly simple, easily minted and inexpensive controllers.

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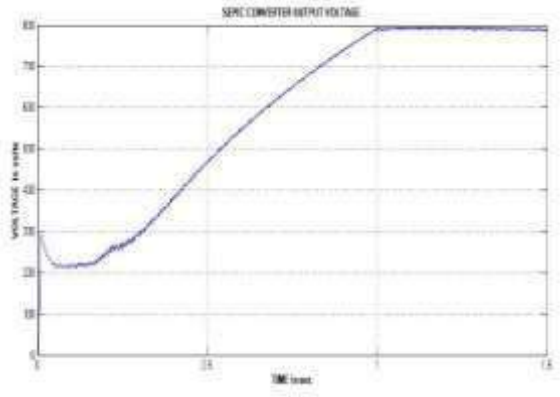
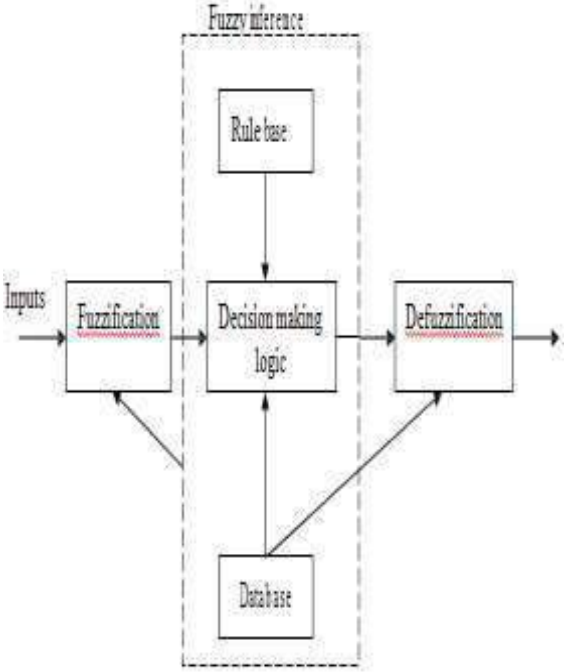
Fuzzy logic controller can model nonlinear system: The design of conventional control systems sentialis normally based on the mathematical model of the system. If an appropriate



mathematical model is available with known parameters it can be analysed.



Block Diagram of Fuzzy logic control

The adaptive characteristics can achieve robust performance to system with uncertainty parameters variation and load disturbances.

7. DSPIC30F2010 :

A special type of microcontroller used for controlling both converter and inverter regions. A microcontroller consisting with a special type of fuzzy logic controlling technique which will improves the stability of the system. microcontroller having a special features of Enhanced Flash program memory of 10,000 erase/write cycle (min.) for industrial temperature range, 100K (typical) , Data EEPROM memory of 100,000 erase/write cycle (min.) for industrial temperature range, 1M (typical) . Self-reprogrammable under software control .Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST) . Flexible Watchdog Timer (WDT) with on-chip low power RC oscillator for reliable operation. Fail-Safe clock monitor operation

8. SIMULATION RESULTS

The simulations waveforms of system components are given below

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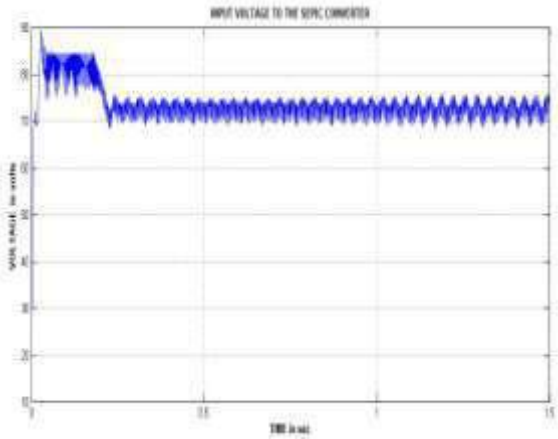

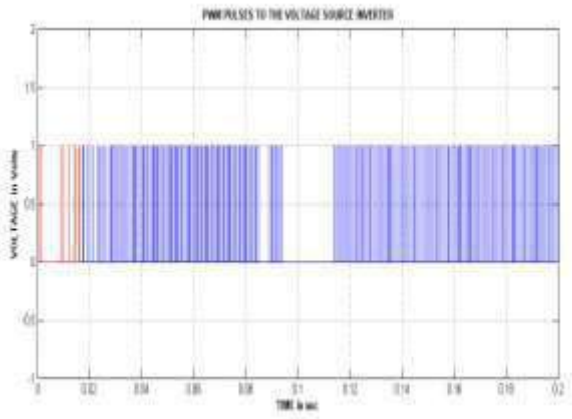

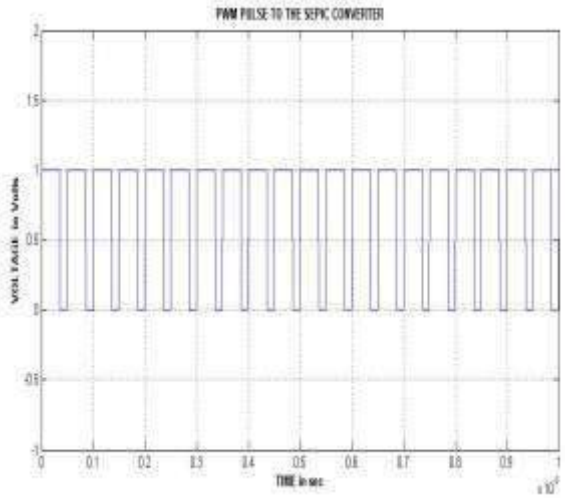

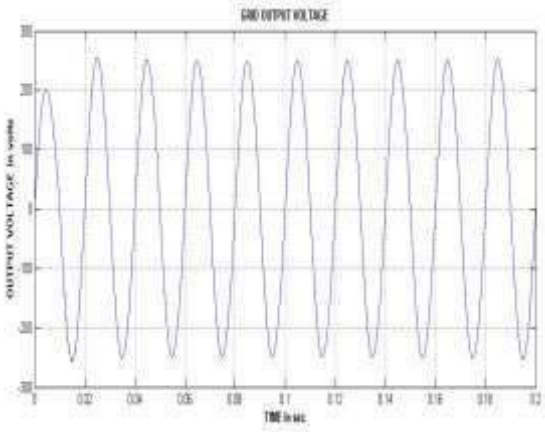

CONCLUSION

A single phase transformerless online uninterruptible power supply has been proposed in this paper. A bridgeless boost rectifier has been used with average current control method that increases the efficiency of the system and provides the power factor correction. A new bidirectional converter for battery charging/discharging has been implemented which ensures transformerless operation and reduces the battery banksignificantly. A new control for the inverter provides regulated sinusoidal output voltage with low THD for both linear and non-linear load. Overall the volume of the system is minimized by reducing the size, weight, and battery bank of the system. The experimental results show good dynamic and steady state performance. It may be enhanced to

develop this proposed UPS system to three phase transformerless online UPS system.

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