Enhanced Power Quality/Efficiency Using Bridgeless Converter Using MO-SMPS

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Abstract: ***In this thesis, the performance of single phase and three phases AC to DC converter and energy conversion to application are investigation is to identify the development of new control schemes. This type of involving low frequency in energy transfer is of great interest in energy conversion system. This application is motivated by, first a single –phase boost converter is studied and the proposed controller in providing a input resistive behavior is verified experimentally. Next, the proposed for a single phase converter is converted to a three phase bridgeless boost -type converter. To this end, the three converters are the model of average is obtained and designating in utilized a feedback control scheme to a resistive across of the converter in each phase. The single- phase system is similar is. The doe's not required proposed controller a knowledge of the wave form input characteristics and time –varying frequencies and amplitude are convert into regulating by DC power. The each phase of input resistance.***

Keywords: PFC, PIcontroller, Bridgeless rectifier,THD, DCM

1. Introduction

In year recent the technology in the advancement, the semi conductor switches based on application in power electronics has fetched economical profit and many technical, but it has power system operation of currently introduced new challenge studies. The utilization of computer, telecom equipments biomedical. Hence increase in low power density and the higher power consumption are leads. The goal of dealing in application.

1.1 Background Research

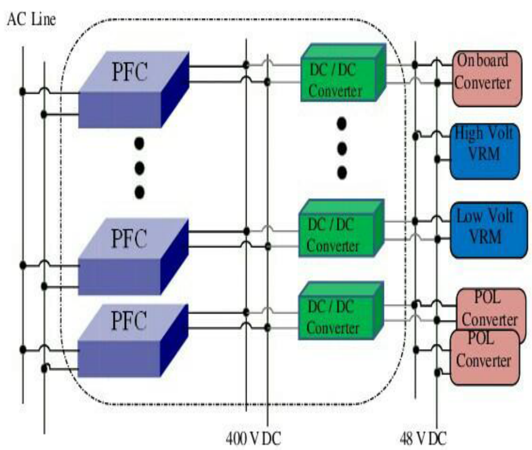

Figure 1: Structure of basic distributed power system

1.2 The power grid of non-linear effect

The different way of utility power grid. The power grid of electronic equipment connected in electricity of smooth sin way current rather than non-sinusoidal line current. This converter is connected in single phase alternating current the ac –dc rectifier circuit as well as power grid. The input voltage is greater than the output voltage due to the bridge rectifier diode of the short time duration. The experimental set-up of single-phase alternating current-direct current (ac-dc) bridge rectifier followed by bulk capacitor. The input line voltage and line current waveforms of supply frequency 50 Hz.

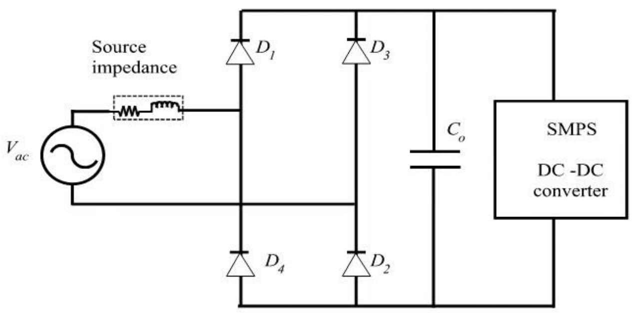

Figure 2: schematic diagram

are used the front end. In the first stage- the power factor corrections in parallel provide connected the front end converter and second stage the output dc voltage are required highest regulations and provides isolation.

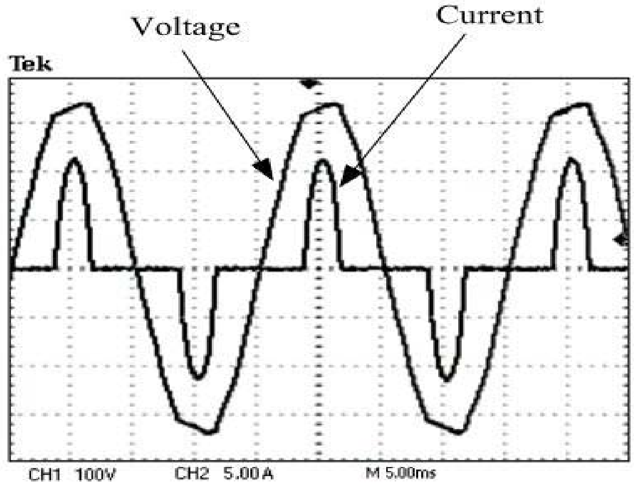

Figure 3:- Experimentally Obtained Input Voltage And Current Waveforms

1.3 Power Factor Correction:

It is the important of the load is delivered to the real power. The different application applied to power correction. The transmission network to improve the efficiency and stability of electrical power transmission the high value improving the power factor .the power grid generated in the voltage ad current. It is the two method of the distribution system. To minimize their effects on the distribution system and hence to improve its efficiency. The overall performance of the grid or distribution systems, namely passive method, and active method. The ac line and the input port of the diode rectifier of ac-dc converter.

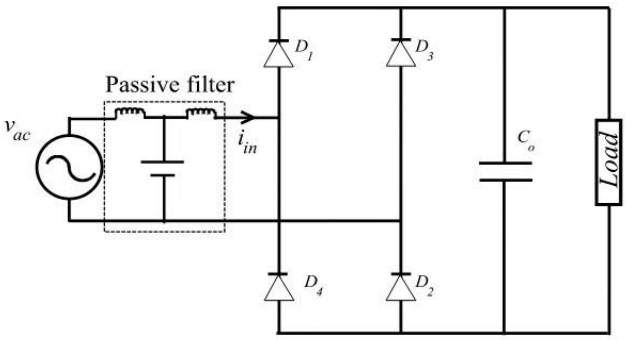

Figure 4: Passive power factor correction technique

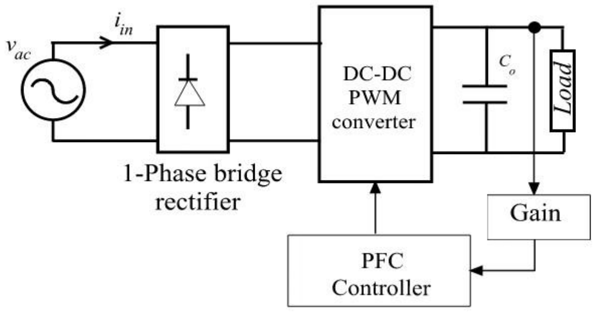

Figure 5: Active power factor correction technique.

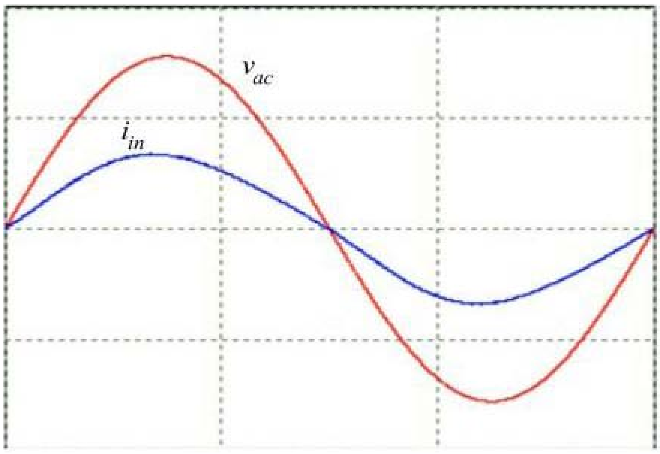

Figure 6: Input voltage and input current response of active PFC technique.

The research is focused in the area of active pfc converter to achieve near unity input power factor and hence to increase quality of power in the grid. In active pfc technique, the input power factor can reach nearly unity and the ac-dc interface of power converter emulates a pure resistor . The boost converter is widely used as a dc-dc converter for pfc applications and is most suitable topology for pfc preregulator in telecom applications the dc-dc converter of boost topology is the basic interest of our research and our significance of novel techniques are applied to boost converter in PFC pre-regulator system.

2. Interleaved boost convertor

The boost convertor interleaved PFC. It is consist of two boost convertor in parallel out of phase 180 degree. The two inductor current in lb_1 and lb_2 in the sum of the input current. Since out of the phase of the inductor are ripple current, so they cowheel each other out to tend and the boost inductor by reduce the high frequency input ripple current. It is used a passive snubbed by operating in the discontinuous current mode can be improve to the conduction losses are reduced. The three level boost convertor are used in application high power as well as boost converter interleaved. The three level boost converter of the frequency ripple current and the boost converter are twice interleaved.

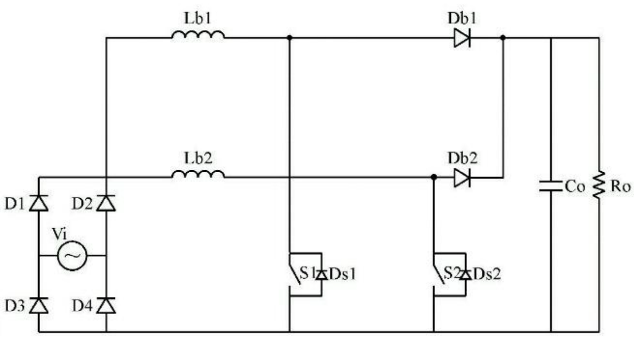

Figure 7: Half-Bridge Boost Converter (HBBC)

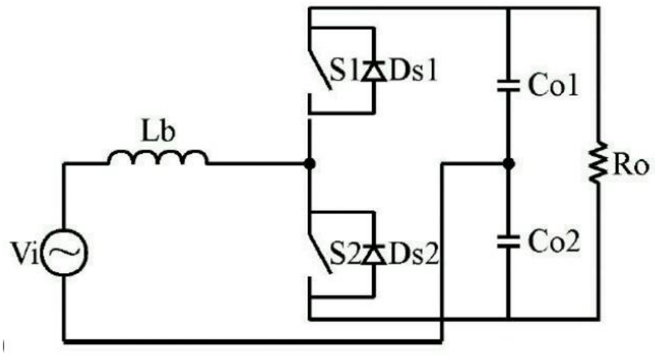

Figure 8: Full-Bridge Boost Converter

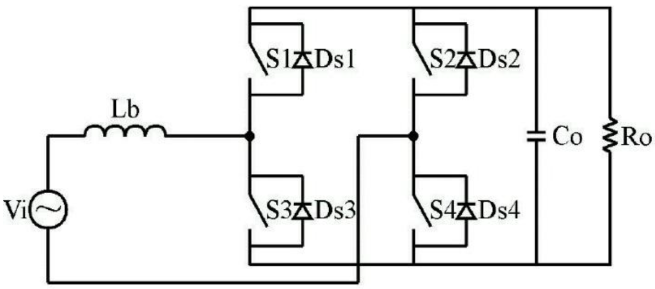

Figure9: Conventional Boost Converter

The bridgeless boost converter can be operated at the discontinuous conduction mode, ccm, critical conduction mode (CRM).the different load operated of the boost inductor current. The application of the dcm is small power boost pfc converter. While the application of the ccm is high and medium power boost pfc component of cost and bulk. For aspic boost converter ccm, both the required are voltage control loop and current control loop. The control loop to be used current control looped the converter to b input current is average of the same shape. The dc output voltage is used to regulate the control looped voltage.

3. Modular system

The use of three-phase AC-DC rectifiers with high quality input currents with excellent output voltage regulation to meet tele communication standards. In this Modular approach, three identical single-phase AC-DC converter modules are connected in Parallel to form a three-phase converter system with or without using the neutral line of the Three phase power supply. This approach of three-phase AC-DC converter has its own vantage Of providing 48 V or 24 V DC voltage output from three-phase AC supply with a direct Single stage power converter with automatic PFC, electrical isolation and simple DC-DC Control characteristics. The modular approach has the following advantages.

- Improved reliability and performance of converters. Flexibility in expanding the power rating of converters.
- Low periodic maintenance and repair of power converters because of the use of standard single-phase converter units.
- Avoids the use of expensive components of larger rating which may occur in single high power converter.
- Calibration of components directing to reduction in manufacturing cost and time.

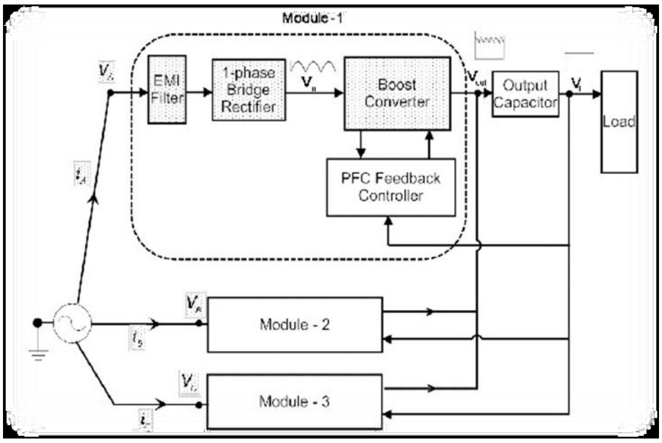

Figure 10: Block Diagram of Three Identical PFC Converters in Modulator

Modular approach presented in the three – phase applications suffers from problem of phase current interactions between different modules, this phase current interaction affects the slope of the boost inductor current during the off period of the main switch.

4. Methodology

4.1 Non-isolated buck-boost converter: The boost converter in discontinuous conduction mode or continuous conduction mode for power factor correction, the efficiency is increase if the boost converter power factor correction the switching is low. The complexity reducing the voltage and current DCM to avoid sensor.

4.2 .SEPIC converter: The power factor application of the SEPIC converter it combines the fly back converter and boost converter. The ac side of high frequency filter reduced the switch.

4.3. Proposed method: The method used to proportional integral controller to replaced the neural network.

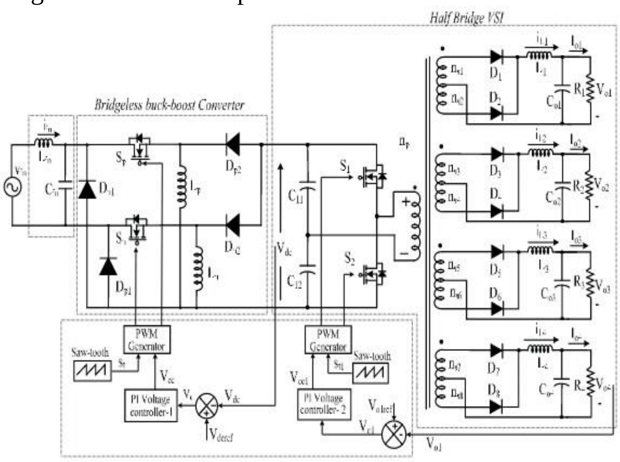

Figure 11: Proposed Bridgeless Converter Based Multiple Output

4.4. Operating principle of bridgeless converter based multiple output SMPS : The proposed bridgeless converter based multiple output SMPS consists of a single-phase ac supply feeding two back to back connected buck-boost converters with a half-bridge VSI and multiple output HFT at the load end. The buck-boost converters are controlled suitably to obtain a high PF and low input current THD. The half-bridge VSI at the output takes care of high frequency isolation with multiple dc output voltages being regulated.

4.5Total harmonic distortion: The RMS value of the harmonic fundamental at varying input voltage and load varying of the value. The power quality loading to very low power factor and theca mains of high power factor of the input current is high harmonic distortion. The output value of the buck-boost converter is constant with a small overshoot. It needs to be monitoring and distortion is power quality problem. The efficiency 75% increasing and 25% decresing.It reduced the total harmonic distortion at input ac mains and dc output regulated. Harmonic pollutions and power system in low power factor caused by power converter.

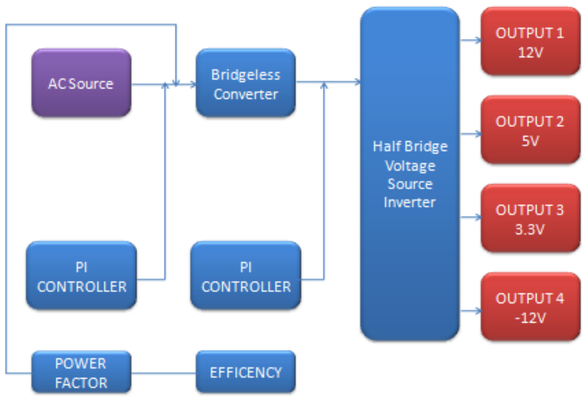

Figure 12: Block Diagram Implementing PI Controller

5. Control Of Proposed Bridgeless Converter Based Multiple Output SMPS

5.1 Pulse generator PWM : The PWM pulse generator the output of PI controller the fixed high frequencies saw-tooth ramp is the output of the PI controller saw tooth ramp is less than the switch turn on, it is off.

5.2 Isolated SEPIC for control : The output voltage as input voltage to the SEPIC is DC voltage. The control of SEPIC is carried out in continuous conduction mode (CCM) to reduce. The consist of one PI controller and PWM pulse generator.

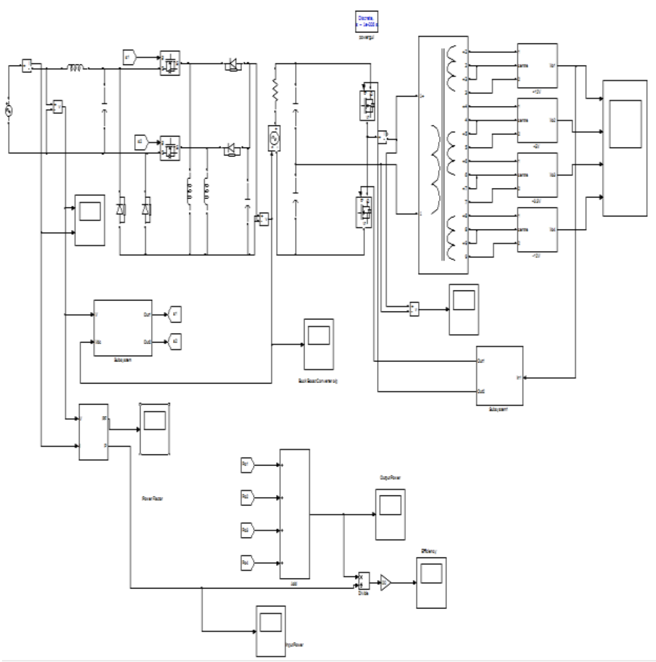

Figure 13: MATLAB/Simulation Of Improved Bridgeless Converter Based Multiple Output SMPS

6. Result and Discussion

This section,simulation results of an improed power quility SMPS using bridgeless converter and discused in details. To study the perfromance of the SMPS and if various power quility with specified limits. The simuated waveform of the SMPS, a stepchange in loadds id applied simultneously on +12V and +5 output. The load on +12V output is varied from 100% to 20%.at 0.15 and simultaneously in +5V, it is varied from 100% to 70% at 0.25s. the output voltage of the buck-boost converter is maintained contant with a small overshoot. Multttipul output dc voltage remain constant. THD of the input ac mains current is observed as 5.14% the input current harmonics content is within international standard limits with unity PF at the utility interface.

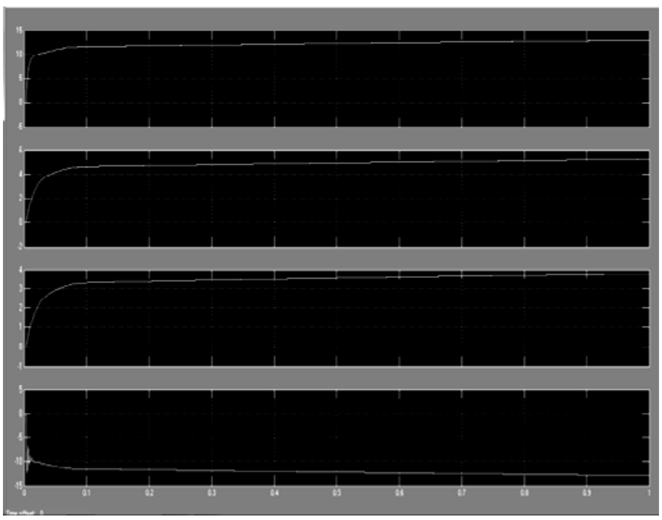

Figure 14: Input Voltage,Current,Bridgeless Buck-Boost Converter Output Voltage Half Bridge VSI

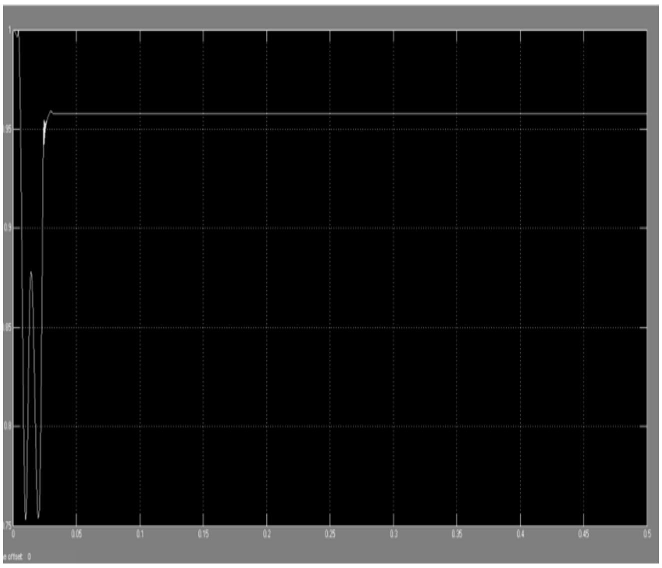

Figure 15: Output Efficiency Of The Implemented Circuit

The experimentally obtained efficiency of the implemented circuit,as function of the output power,whose minimum value is greater than 80%. The efficiency can be improved by the employement of a soft commutation technique.

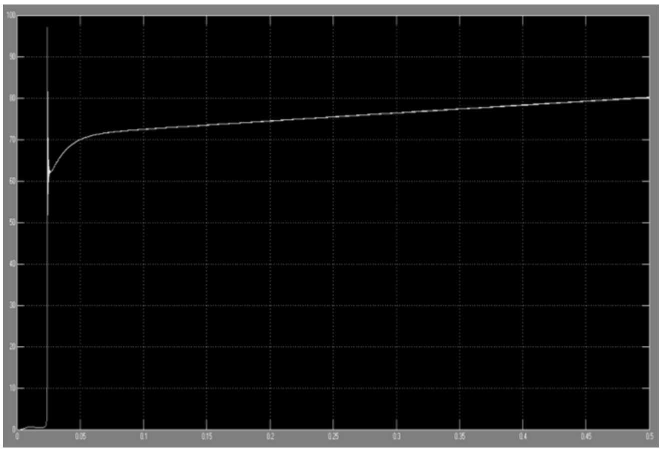

Figure 16: Power Factor Output

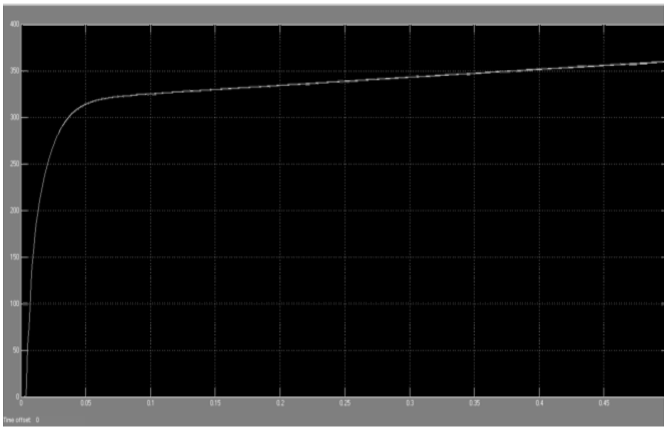

Figure 17: Output Voltage Of The Converter

7. Conclusion & Future Scope

An improved power quality SMPS for personal computer application. The input current THD of over 83.5% and PF of less than 16.5 at the utility interface under varying input voltage. It is used to DC-DC converter has been designed and modeled. The first stage DC voltage of the buck-boost converter has been maintained constant, independent of the input voltage is changes. Half-bridge DC-DC converter is used for obtained multiple DC output at the second stage. In Future, the same design can be implemented using Neural Network for more efficient output results.

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