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A Family Of Excessive Capacity Gain Unique Component Mule Switched Capacitor Percent Rectifiers

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ABSTRACT

In this paper your three-layered multi-level proposition is proposed utilizing a half and half switch capacitor idea. The converter is appropriate for high voltage pick up applications from conventional three-stage low voltage sources. The three-level voltage process decreases the weight and greater part of the attractive gadgets. The primary favorable circumstances of the proposed transformer are: low number of dynamic switches, high voltage increment, sinus streams, low voltage worry over all parts and basic control. Both static and dynamic examination are explored. The trial comes about for the 7500 W/220 V-to-1600V lab show are shown with most extreme proficiency of 97.78% and examined requiring high voltage pick up converters regularly revealed in expert writing.

I INTRODUCTION

These applications include lasers, radars, X-Ray and other medical equipments [1]–[3]. In these cases the power flow is unidirectional and the conventional grid is the main source, being the load supplied through a high dc-link voltage. Because of this, a high voltage ac-dc power conversion is necessary. For low power levels single-phase voltage multiplier circuits are often employed due to robustness and simple operation.With the increase of the power load the use of threephase converters become necessary. However, it should be provided mechanisms to reduce the voltage stress across the components and increase the ac current quality. In [3] a three-phase symmetrical multistage voltage multiplier has been presented. This converter merges three voltage multiplier cells connected to isolated three-phase voltage source to achieve high gain conversion. It has the advantage that all semiconductors are subjected to low voltage, which allows the operation with high dc-link voltage. As drawback, the capacitors operate at the grid frequency, leading to anincrease of the bulk and weight of the conversion system. Moreover, the ac currents have high harmonic distortion due to absence of active control. Because of related problems, in [7] a three-phase

step-up multiplier with a switching device is proposed. It comprises of a three-phase diode bridge connected to boost converter and a voltage multiplier cell. The voltage gain can be increased just adding diode-capacitor cells. The active switch is subjected to low voltage and the capacitors operating at high frequency. In contrast, the ac currents do not have the shape of the input voltages, thus the unitary power factor is not possible.

In order to increase the ac current quality, three-level PWM rectifiers have become a interesting alternative to three-phase applications [8]–[13]. They feature high performance for PFC operation, high efficiency and high power density. On other hand, these converts are suitable for low dc-link voltage (lower than 1000 V). To higher dc-link voltages, converters with four and five levels are more attractive [14] [15]. However, the number of active switches and voltage sensors is increased substantially, raising the cost and complexity of the system. Switched-Capacitor Based Converter The switched-capacitor based on active network converter technique [13] is shown in the figure.3. Figure 3: Circuit diagram of the Switched-Capacitor based Converter This converter is fed from the solar panel with the input voltage of Vi. It consists of series and parallel connection of series and parallel connection of two inductors L1 and L2.There are two power MOSFET switches S1 and S2. These two switches are sharing the same switching signal. The inductors L1 and L2 are parallel connected when the switches S1 and S2 are turned ON simultaneously. When the switches S1 and S2 are turned OFF, then the inductors L1 and L2 are connected in series. The switched capacitor unit is formed by the multiple capacitors and diodes on the output stacking form. High voltage gain is achieved by the series and parallel connection of capacitors. Diodes D1, D2, D3 and capacitors C1, C2, C3 forms the switched capacitor unit. There are two modes of operation. During mode-I, switch S1 and S2 are turned ON and the inductors L1 and L2 are charged in parallel through the dc source also the capacitor C2 gets charged. Then the energy in the capacitor C1, C3 gets released into the load. During mode-II, switches S1 and S2 are turned OFF. Capacitors C1 gets charged and the capacitor C2 is discharged. The high voltage gain is achieved by the Switched-Capacitor based Converter, that ten times of the voltage ratio. Thus, current ripple and current stress of the power components are greatly reduced. During analysis of the proposed converter, the voltage stress across the switch is also less which is beneficial to the cost and efficiency.

II OPERATION PRINCIPLE OF THE PROPOSED CONVERTER

Features of proposed converter

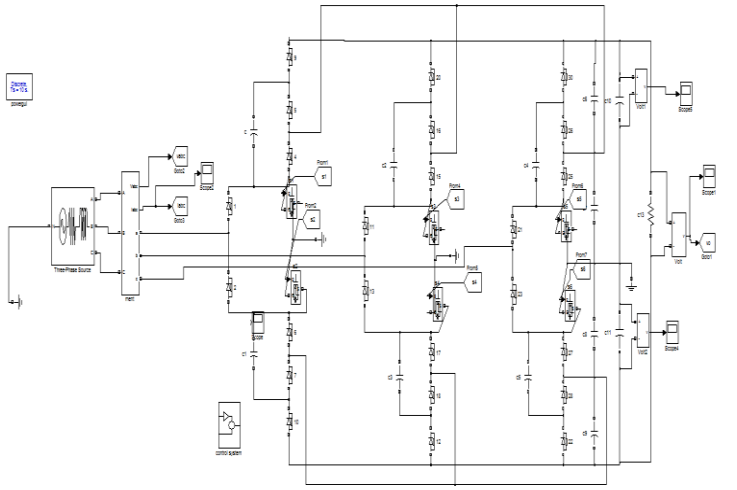
The proposed converter. The topology comprises six active switches 2, 18 fast diodes, 6 slow diodes and 12 capacitors. It presents PFC operation and has twice gain of the conventional three-level rectifiers. All components are subjected to 1/4 of the output voltage Vo having, therefore, considerable reduction of the switching losses, enabling the use of low voltage devices. The voltage across capacitors Ck i;j , i 2 f1; 2; 3g, j 2 fA;Bg, k 2 fa; b; cg, have the selfregulation ensured by the PWM modulator and, therefore, is not necessary the use of the voltage sensors for these. For the output voltage regulation two voltage sensors are necessary only. At switching terminals a; b; and c three-level voltages can be generated leading to reduction of bulk of the magnetic devices, increasing the current quality and power density. The capacitors Co;j are connected to load and they must meet holdup time requirements.

III. Principle of Operation and Switching States

Through of the sign of the currents and state of the switches the topological stages can be determined. In total, there are 25 possible states. In this paper six topological stages will be described only. In the switching states valid to ig;a > 0, ig;b < 0, ig;c < 0 and ig;c > ig;b are depicted. For simplicity, the input ac voltage sources vg;k, k 2 fa; b; cg, inductors Lb and load resistance RL are omitted in figure. In the following, the basic principle of operation of the three-phase hybrid PFC rectifier is explained based on somesimplifying assumptions.

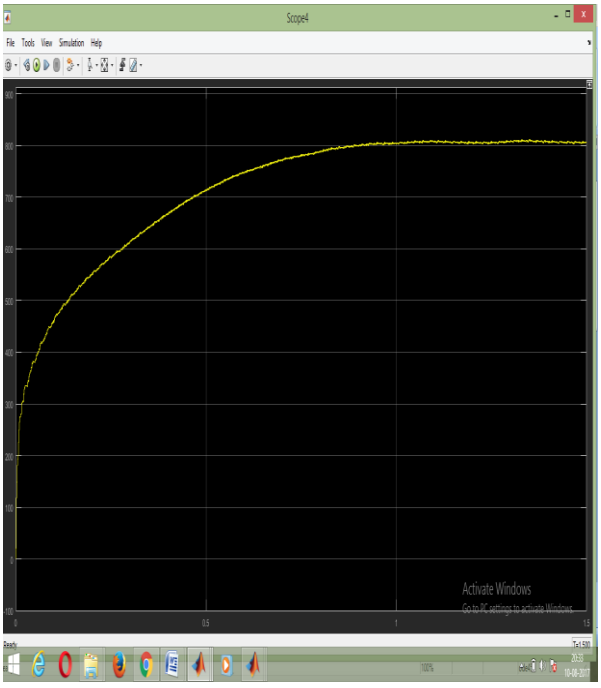
IV RESULT:

Fig Model File And Simulation Results



Vo

Vo1



V CONCLUSION

A three-phase hybrid switched-capacitor multilevel PFC PWM rectifier aiming high voltage gain applications has been presented in this paper. This topology use at the same time the inductive storage and the switched-capacitor concept to achieve a high voltage conversion and PFC operation, simultaneously. The three-level operation enables the bulk/weight reduction of the magnetic components. The main feature are low number of active switches and the fact of all components are subjected to 1/4 of output voltage, allowing the use of reduced ratings power semiconductor devices. A suitable control scheme has been presented, where can be seen that synchronous reference frame strategy, used in conventional three-level converters, can also be employed in the proposed converter. Transfer functions for the design of the current regulators and voltage regulators were presented. A 7.5 kW/ 220 V-to 1600 V/ 80 kHz laboratory prototype has been built and tested, where the efficiency of 97.78% reached attest the feasibility of this concept technology. In summary, the current topologies, presented in the introduction, have interesting features for high voltage gain 3The auxiliary power supply for gate drivers, fans, and control has not been considered during the tests. applications, but do not have at same time high voltage gain, robustness, low number of active switches and sinusoidalshape currents. Because of this, the proposed concept presented may be an

attractive alternative to high voltage gain in three-phase rectification, with low impact to the grid.

REFERENCES

[1] H. Takano, J. Takahashi, J. Sun, and M. Nakaoka, "Comparative study of resonant and non-resonant dc-dc converter with parasitic lc components of high-voltage transformer," in Industry Applications Conference, 1998. Thirty-Third IAS Annual Meeting. The 1998 IEEE, vol. 2, Oct 1998, pp. 1580–1587 vol.2.

[2] J.-F. C. Lung Sheng Yang, Tsorng-Juu Liang, "Transformerless dc-dc converters with high step-up voltage gain," Industrial Electronics, IEEE Transactions on, vol. 56, no. 8, pp. 3144–3152, Aug 2009.

[3] S. Iqbal, "A three-phase symmetrical multistage voltage multiplier,"IEEE Power Electronics Letters, vol. 3, no. 1, pp. 30–33, Mar. 2005.

[4] I. Kobougias and E. Tatakis, "Optimal design of a half-wave Cockcroft 2013;walton voltage multiplier with minimum total capacitance," Power Electronics, IEEE Transactions on, vol. 25, no. 9, pp. 2460–2468, Sept 2010.

[5] C.-M. Young, M.-H. Chen, and C.-C. Ko, "High power factor transformerless single-stage single-phase ac to high-voltage dc converter with voltage multiplier," Power Electronics, IET, vol. 5, no. 2, pp. 149–157, Feb 2012.

[6] S. Iqbal, "A hybrid symmetrical voltage multiplier," Power Electronics, IEEE Transactions on, vol. 29, no. 1, pp. 6–12, Jan 2014.

[7] Y. Berkovich, A. Shenkman, B. Axelrod, and G. Golan, "Structures of transformerless step-up and step-down controlled rectifiers," IET Power Electronics, vol. 1, no. 2, pp. 245–254, Jun. 2008.

[8] J. Kolar and F. C. Zach, "A novel three-phase utility interface minimizing line current harmonics of high-power telecommunications rectifier modules," in Telecommunications Energy Conference, 1994. INTELEC '94., 16th International, Oct 1994, pp. 367–374.

[9] Y. Zhao, Y. Li, and T. Lipo, "Force commutated three level boost type rectifier," Industry Applications, IEEE Transactions on, vol. 31, no. 1, pp. 155–161, Jan 1995.

[10] T. Soeiro and J. Kolar, "Analysis of high-efficiency three-phase two- and three-level unidirectional hybrid rectifiers," Industrial Electronics, IEEE Transactions on, vol. 60, no. 9, pp. 3589–3601, Sept 2013.

[11] M. Heldwein, S. Mussa, and I. Barbi, "Three-phase multilevel PWM rectifiers based on conventional bidirectional converters," IEEE Transactions on Power Electronics, vol. 25, no. 3, pp. 545–549, Mar. 2010.

[12] M. Silveira Ortmann, S. Mussa, and M. Lobo Heldwein, "Three-phase multilevel PFC

rectifier based on multistate switching cells," IEEE Transactions on Power Electronics, vol. 30, no. 4, pp. 1843–1854, Apr.
2015.

[13] T. Soeiro and J. Kolar, "Analysis of high-efficiency three-phase two- and three-level unidirectional hybrid rectifiers," Industrial Electronics, IEEETransactions on, vol. 60, no. 9, pp. 3589–3601, Sept 2013.

[14] K. Corzine and J. Baker, "Reduced-parts-count multilevel rectifiers,"IEEE Transactions on Industrial Electronics, vol. 49, no. 4, pp. 766–774, Aug. 2002.

[15] A. Ruderman, "Three-phase multi-level PWM rectifier multi-carrier discontinuousvoltage modulation strategy," in 2007 European Conferenceon Power Electronics and Applications, Sep. 2007, pp. 1–9.

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