POWER QUALITY IMPROVEMENT USING DYNAMIC VOLTAGE RESTORER (DVR)

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ABSTRACT:

Power Quality (PQ) in modern power systems is a high demanding concern in both Medium Voltage (MV) and Low Voltage (LV) networks for all industrial, commercial, and domestic users. Different PO problems have been reported and categorized. Among these voltage RMS variations, they may be caused by various reasons in power systems, which are most often reported as essential issues. In particular, recent fast development and high grid penetration of renewable energies made it more difficult and challenging to respect to the RMS voltage standards. Indeed European standards persuade Distribution System Operators (DSOs) to provide the LV user's voltage within the standard range, so voltage regulation within the standard range is becoming more and more critical for DSOs, especially within future and smart grid systems. Therefore it is economically and technically rationale for DSOs to investigate flexible and advance PQ conditioners for LV distribution networks.

I.INTRODUCTION:

Renewable is now the advance fastest-growing energy source and is expected to increase. To achieve high step-up conversion, some converters Use a transformer with a high turn's ratio. Still, this transformer has large leakage inductance and parasitic capacitance that can cause high voltage or current spike on the power devices. Also, to minimize input current ripple, a converter with continuous input current is Preferred because as the ripple decreases, the conduction loss of the primary-side switches and the size of the input electrolytic capacitors can be decreasedCurrent-fed type converters can meet most of these requirements and are therefore widely used renewable energy systems.

A converter designed with an input-current doubler along with an active-clamp circuit and an output-voltage doubler has low conduction loss at the primary side because the input current doubler divides the input current into two Inductor currents, and the output-voltage doubler is equipped with a series resonant circuit that can turn off the output diodes when current is zero. A quasi-resonant current-fed converter with high efficiency uses an active-clamp course in the primary side to generate quasi-resonant operation, thereby reducing the switching loss and current stress, and eliminating the reverse recovery problem of the diodes in the voltage doubler.

This converter is usually used for low power applications because it relies only on two switches at the first side. Interleaved current-fed dual-active-bridge DC-DC converters have been proposed to reduce the input current ripple further. However, the duty cycle of the switches used at the primary side varies with the input voltage and output load, and the current ripple cannot be zero for the whole range of operation. Also, the interleaved structure may raise the overall cost because it increases the number of components and requires a sophisticated control algorithm. The use of multi-stage converters has been proposed. In a boost cell with full-bridge DC-DC converter provides ripple-free input current, and a voltage doubler at the secondary side increases the voltage gain without having to use a high turn ratio transformer. A boost converter at the primary bottom can significantly reduce the input-current ripple, but high voltage gain can be achieved by using its series connection with a SEPIC converter and by using the coupled inductors. Theoretically, the input-current ripple reduces to zero because the primary-side switches are modulated with constant 0.5 duty cycle regardless of the input voltages and load variations. The proposed converter is controlled by adjusting the duty-cycle of the secondary-side switches. We present detailed circuit operations, steady-state analysis, and design guideline.

II.LITERATURE SURVEY:

Through a voltage multiplier module composed of switched capacitors and coupled inductors, a conventional interleaved boost converter obtains high step-up gain without operating at extreme duty ratio. The configuration of proposed converter not only reduces the current stress but also constrains the input current ripple, which decreases the conduction losses and lengthens the life time of input source. In addition, Due to the lossless passive clamp performance, leakage energy is recycled to the output terminal. Hence, large voltage spikes across the main switches are alleviated and the efficiency is improved. Even the low voltage stress makes the low-voltage-rated MOSFETs can be adopted for reductions of conduction losses and cost.

They method a modular quasi-resonant bi-directional DC/DC converter whichcan increase the output voltage by using the modular resonant stages. These resonant stages shape the current waveform so that soft switching operation ofSwitches are achieved. The proposed converter provides an inherent characteristic, in terms of reducing the voltage stress of switches using modular resonant stages. The topology is presented to improve the efficiency and power density; so, GAN devices are employed regarding their lower switching losses and small size. The simulation results using PSpice proves that performance of the proposed converter is in line with the theoretical analysis.

III. EXISTING SYSTEM:

A high step-up resonant DC-DC converter with a ripple-free input current for renewable energy systems. We use an input-current doubler and a switching mechanism employed at an output-voltage doubler to achieve high step-up voltage gain without having to use a transformer with a high turn’s ratio. At the switch components and recycles the energy stored in the leakage inductance. A resonance that occurs at the secondary side of the converter is used. They proposed a high step-up resonant DC-DC converter with a ripple-free input current for renewable energy systems. We use an input-current doubler and a switching mechanism employed at an output-voltage doubler to achieve high step-up voltage gain without having to use a transformer with a high turn’s ratio. At the switch components and recycles the energy stored in the leakage inductance

The STATCOM basically consists of a step down transformer with a leakage reactance, a voltage source inverter (VSI), a capacitor in its DC side and a control system. The inverter in conventional STATCOM, switched with a single pulse per period and the transformer is connected in order to provide harmonic minimization and serve as a link between VSI and the system. The leakage inductor limits the negative sequence currents. The capacitor is used to maintain DC voltage to the inverter. The inverter itself keeps the capacitor charged to the required level.

3.1 DRAWBACKS:

- High harmonic content.

VI. PROPOSED SYSTEM:

The project introduces a new control method of a single-phase DVC system able to compensate these long duration voltage drifts. For these events, it is mandatory to avoid active power exchanges so, the controller is designed to work with no active power only. Operation limits for quadrature voltage injection control is formulated and reference voltage update procedure is proposed to guarantee its continuous operating the hardware configuration of the proposed single-phase DVC is shown in Fig. 1. The system consists of a full bridge converter with capacitor bank as DC bus. The converter is connected in series to the line by means of a coupling transformer. The system is equipped with *Bypass* switch in order to bypass the device in case of any fault of the DVC device and also to protect DVC inverter and other components against possible damages originated from LV network side. In Fig. 1, V_s stands for grid voltage. The DVC is meant to keep PCC voltage (V_{PCC})at set value (V_{PCCref}) by injecting proper voltage (V_x) in series to the line.

4.1 PROPOSED SYSTEM BLOCK DIAGRAM:

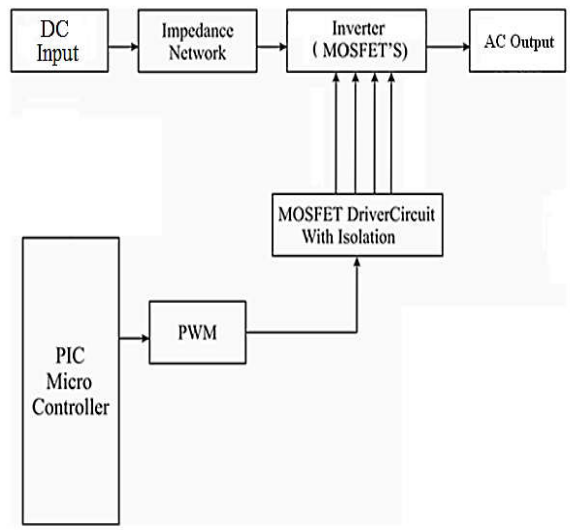

Figure 1:Proposed Block diagram

DC-DC converter with a ripple-free input current for renewable energy systems. An input-current doubler and a switching mechanism employed at the output-voltage doubler provide high step-up voltage gain without requiring a high turn's ratio transformer. We also use an active-clamp circuit that can suppress the surge voltage of the switches and can recycle the energy stored in the leakage inductance. The proposed converter exploits the resonance to reduce the switching losses considerably. Theoretically, the input-current ripple reduces to zero because the primary-side switches are modulated with a constant duty cycle regardless of the input voltages and load variations. The proposed converter s controlled by adjusting the duty-cycle of the secondary-side switches.

4.2 ADVANTAGES:

- Single-phase design can decrease device initial cost and it is also more compatible with LV distribution and mostly single-phase domestic loads.
- Good performance and it can improve PQ level of the installed distribution Smart Grid network effectively.

4.3 APPLICATIONS:

- This device can be used effectively in LV distribution network with single phase loads.

V.PROJECT DESCRIPTION:

Automatic mains change over switch for uninterrupted power supply is an integral part of the power control process, allowing smooth and immediate transfer of electrical current between multiple sources and the load. Here we are using two transformers TF1 (Main transformer) and TF2 (Backup transformer). The transfers switch senses when utility power is interrupted, and starts up the transformer TF2 which acts as a backup transformer. If the utility power remains absent, the transfer switch disconnects the load from the utility and connects it to the Transformer TF2, restoring electricity to the load. The transfer switch continues to monitor utility power, and when it is restored, switches the load from the Transformer TF2 back to the Main transformer TF1. Once the Transformer TF2 is disconnected, it goes through a cool-down routine and is automatically shut down.

VI.EXPECTED RESULT:

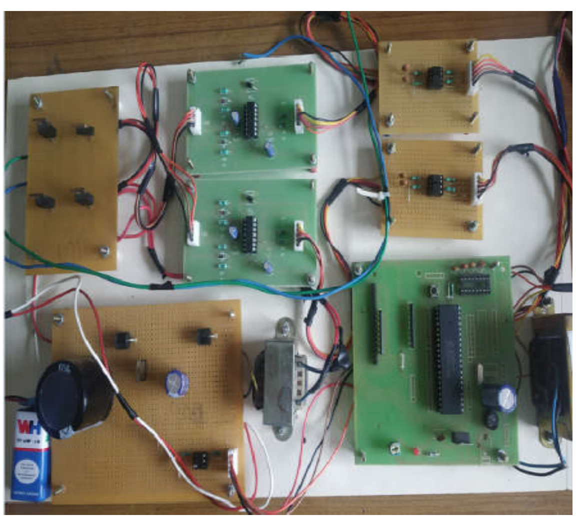

Figure 2: Hardware result Output

The proposed system hardware model for the system power analysis, this model consist of generating power, step-down transformer, rectifier, inverter, current transformer, step-up transformer, load.The operation of this hardware model is generating station is give the source voltage and it is step-down the voltage from 230v to 110v with help of step-down transformer.Power supply from the DVR The function of the DVR is to ensure that any load voltage disturbance can be compensated for effectively and the disturbance is therefore transparent to the load.The injection of an appropriate voltage in the face of voltage sag needs both real and reactive power which must be supplied by the DVR. Large capacitors are used as energy storage devices in DVR. The voltage disturbance correction requires a certain amount of real and reactive power supply from the DVR.The function of an inverter is to change a DC input voltage to AC output voltage of desired magnitude and frequency. Three phase inverters are normally used for high power applications.

VII.CONCLUSION:

This project provides a high-level resonant DC-DC converter with a ripple-free input current for renewable energy systems. The proposed converter can achieve high phase voltage gain with minimum number of devices and low transformer. A series-resonant circuit on the secondary side significantly reduces the switching losses, thereby enabling greater power transfer over the entire range of operations. Furthermore, the duty cycle for the primary side switches is set, so the high-frequency input-current ripple is significantly reduced. The experimental tests demonstrated the expected performance of the proposed converter

VII.REFERENCES

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