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Modulation for High frequencies for PWM-Integrated Resonant Converters

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ABSTRACT:

This paper presents a unique modulation method for extending the input range of pulse-width modulation (PWM)- integrated resonant converters, such as the isolated boost resonant converter, while maintaining high conversion efficiency. The technique includes primarily the hybridizing of constant-on, constant off, and fixed-frequency control depending only on the required duty cycle. The modulation scheme reduces core loss and conduction loss dramatically by decreasing the applied volt-seconds at the transformer and improving the switching period utilization. With hybrid-frequency control, the circuit also maintains zero current switching for the output diodes, minimizes switching loss, and eliminates circulating energy at the transformer across the entire operating range. It also allows for a predictable voltage gain, dependent only on duty cycle and transformer turns ratio. A detailed loss analysis is provided and verified against a 180 W experimental prototype, with an input range of 12–48 V and a switching frequency range of 30–70 kHz. Implementation issues are also handled with a variety of solutions for realizing the modulation scheme. Experimental results show greater than 4% weighted efficiency improvement in the prototype using the proposed method.

*Index Terms—****Neighbor position verification, mobile ad hoc networks, vehicular networks***

INTRODUCTION:

In some power electronics applications, it becomes necessary For the converter to adapt to a wide range of input And load conditions.whether the input source is dynamic or the Application calls for a universal input, the ability to maintain High-efficiency energy conversion over a wide range of conditions Is a continual challenge. In many cases, extending the input range of a converter requires Sacrificing conversion efficiency or else adding a Significant number of additional components. With additional Emphasis placed on “weighted” converter efficiency and cost, especially in photovoltaic (pv) applications, efficient, Low-cost enhancements to improve converter efficiency Are desirable. One such method of enhancing converter operation Is the selection of an appropriate modulation scheme. Basic Examples of modulation schemes are well known in literature, Such as traditional pulse-width modulation (pwm) or phaseshift- Control, and have an inherently fixed switching frequency. Other traditional methods have an inherently variable switching Frequency such as constant-on , constant-off Or hysteretic control. In these methods, either a portion Of the switching interval or bounds on a control variable Are kept constant, while the switching frequency is allowed To vary. Other more recent adaptations have involved hybrid Switching schemes such as pwm plus phase shift (pps). Also, in the literature are hybrid modulation schemes of Constant-frequency and constant-off as well as constanton And constant-off.

Existing System:

Power Electronics is a field which combines Power (electric power), Electronics and Control systems. Power engineering deals with the static and rotating power equipment for the generation, transmission and distribution of electric power. Electronics deals with the study of solid state semiconductor power devices and circuits for Power conversion to meet the desired control objectives (to control the output voltage and output power).

Power electronics may be defined as the subject of applications of solid state power semiconductor devices (Thyristors) for the control and conversion of electric power.

Power electronics deals with the study and design of Thyristorised power controllers for variety of application like Heat control, Light/Illumination control, Motor control – AC/DC motor drives used in industries, High voltage power supplies, Vehicle propulsion systems, High voltage direct current (HVDC) transmission.

Proposed System:

Introduce the map reduce algorithm. It is effective for cross domain environment and also can use. The insulated-gate bipolar transistor or IGBT is a three-terminal power semiconductor device, noted for high efficiency and fast switching. It switches electric power in many modern appliances: electric cars, variable speed refrigerators, air-conditioners, and even stereo systems with digital amplifiers. Since it is designed to rapidly turn on and off, amplifiers that use it often synthesize complex waveforms with pulse width modulation and low-pass filters.

The IGBT combines the simple gate-drive characteristics of the MOSFETs with the high-current and low–saturation-voltage capability of bipolar transistors by combining an isolated-gate FET for the control input, and a bipolar power transistor as a switch, in a single device. The IGBT is used in medium- to high-power applications such as switched-mode power supply, traction motor control and induction heating. Large IGBT modules typically consist of many devices in parallel and can have very high current handling capabilities in the order of hundreds of amps with blocking voltages of 6,000 V.

Flying Capacitor Multilevel Inverter

Meynard and Foch introduced a flying-capacitor-based inverter in 1992 . The structure of this inverter is similar to that of the diode-clamped inverter except that instead of using clamping diodes, the inverter uses capacitors in their place. The circuit topology of the flying capacitor multilevel inverter is shown in Figure 31.7. This topology has a ladder structure of dc side capacitors, where the voltage on each capacitor differs from that of the next capacitor. The voltage increment between two adjacent capacitor legs gives the size of the voltage steps in the output waveform.

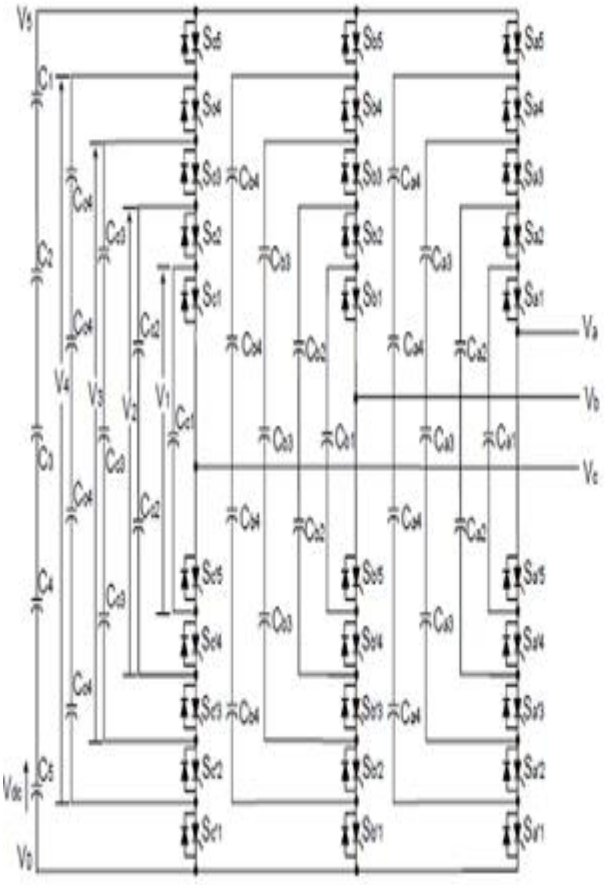
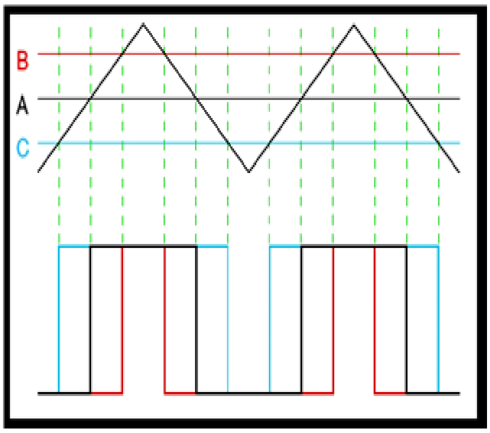


Fig: Three-Phase Six-level structure of a flting capacitor inverter

Moreover, the flying-capacitor inverter has phase redundancies, whereas the diode-clamped inverter has only line-line redundancies. These redundancies allow a choice of charging/discharging specific capacitors and can be incorporated in the control system for balancing the voltages across the various levels.



CONCLUSION

In order to extend the line range of the IBR converter while maintaining high weighted efficiency, a special hybridfrequency modulation scheme is proposed. The scheme reduces core and conduction loss dramatically by decreasing the applied volt-seconds at the transformer and improving the switching period utilization. With hybrid-frequency control, the circuit also maintains ZCS for the output diodes, minimizes switching loss, and eliminates circulating energy at the transformer across the entire operating range. It also allows for a predictable voltage gain, dependent only on duty cycle and transformer turns ratio. The algorithm uses fixed-frequency, constant-on, and constantoff techniques depending only on the required duty cycle. At extremely high or low duty cycles, the converter operates under fixed-frequency control to limit the maximum switching period and prevent magnetic saturation. At a duty cycle less than 50%, but above the specified minimum, the converter operates under constant-on control, ensuring that the resonant period fully completes. Likewise, for duty cycles greater than 50%, the converter operates under constant-off, ensuring complete resonance. Under this method, dramatic reductions in transformer core loss and converter conduction loss are possible for a small increase in switching-related losses. In support of this algorithm, a theoretical analysis was provided that matches well with experimental data for the majority of line and load conditions.

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