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Title: **MODELING AND DESIGN OF INTERLEAVED BOOST CONVERTER IN POWER SYSTEM NETWORK**

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MODELING AND DESIGN OF INTERLEAVED BOOST CONVERTER IN POWER SYSTEM NETWORK

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Abstract:
Modeling of the interlaced DC up to DC converter, to combine fuel cell power generation with grid was presented in paper. A modern PWM (Pulse Width Modulation) technique is implemented in integrating alternating PSC control with traditional interleaved PWM control with the Fuel Cell Power System Multiplier for interleaved two-phase boost converters. The key features of the alternating phase shifting control minimize the stress voltage on light-charge switches and retain greater heavy load efficiencies utilizing the traditional interleaving control. The restricted transfer condition of APS to the traditional PWM interleaves power measurement. The above study is focused on a complete regulation of the power spectrum, which incorporates APS and traditional interleaving. By adopting MATLAB software, effects of simulations are analyzed.

Keywords: Boost Converter, Fuel Cell, Voltage Multiplier.

I. INTRODUCTION:

There has been a substantial increase at present in energy production from the fuel cells in distribution systems. Present generations of renewable energy are increasingly growing to meet demand for electricity. The energy system for renewables converts energy from solar, wind and dropping water into energy. Marine wave, geothermal heat or biomass, for example, heat or energy, can be used in either way. The majority of renewables come, either directly or indirectly, from sun and wind and can never be exhausted. Energy sources such as solar and wind is readily available and is very common in India. They create renewable energy that does not harm the ozone layer. Photovoltaics are preferable as India is a tropical country with no distinguishing seasons. In-depth research into renewable energy development has resulted in increasing concern about the decreasing supply of fossil fuels and their impact on fossil fuels. Also, because of energy protection and climate change mitigation, the need for large-scale low carbon solar power production is increasingly pressing. Electrical engineers in the present century have mainly two issues, first one being generated more energy production through the adoption of renewable energy , for example, solar , wind, fuel cells and so on.

In this paper we addressed the fuel cell power generation efficiency review with the help of chopper converters. It is important to investigate renewable vitality, like wind power, sun focused, energy portion, etc. with increasing concerns about vitality and climate. Due to its favorable circumstances, zero performance, low concussions, increased thickness and efficient modularization for convenient energy sources, electric cars, the required age structures, etc., the energy unit is one of the promising decision making units. In light of the energy components, the network related strength structure is shown in the figure. 1. The output voltage is 65 V to 107 V for the 10 kW Proton Trade Movie Power Unit, whereby, the DC / Air Conversion Converter data voltage is expected to be about 700 V, while the DC / DC Converter voltage add-in between the energy part and DC / Air Converter is expected to be between 6 and 11. For the frame as shown in Fig., a high-speed DC / DC converter is required. 1. A high recurrence information current swell is generated in the DC / DC converter, which reduces the life time of the power unit stack [1,2]. Also the use of hydrogen vitality decreases as the current swell of the energy portion stack production increases. In this way the DC / DC converter should have a high rise proportion with the lower information current swell, as shown in Fig.1. The link of existing support converter with swaps inducers, connected inductors, high-recurrent transformers or super condensers (SC) can achieve a very high step up proportion. With high ability, low-voltage push and low EMI, you can achieve high success. If a dynamic channel or dynamic channel may be used to lower the power rating of the stack rendering module swell or the DC / DC conversion converter swell, then this again increases the un permissibility of the frame. The reality is that interlinking the DC / DC converter will lower the DC / DC swells.

A voltage multiplier interleaved support converter was proposed. It has been extended to voltage (M +1) by voltage recovery.

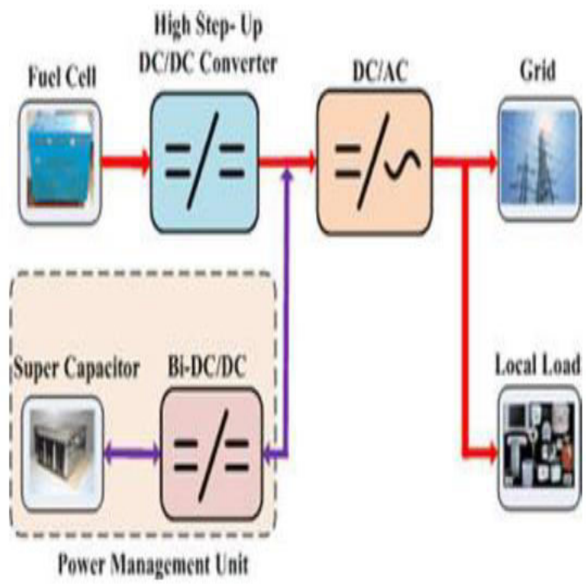

Fig.1. Grid-connected power system based on Fuel Cell.

In contrast to the conventional aid converter, other than lower details the current swells and the voltage swells have a connation [3, 4, 11]. The voltage multiplier interlocking converter is shown in Fig2. In Fig.2 the converter can conduct low voltage stress in

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force gadgets, which increases the efficiency of the transformation. In turn, the voltage anxiety of the force devices only increases when it lives up to DCM mode, which occurs when the power module only supplies a lighter neighborhood load as shown in Fig.1 .. This is only true for overwhelming loads. Higher voltage control gadgets should be used for this situation and its cost and force catastrophe should thus be expanded [5, 9]. These developers suggested a different PWM control scheme called APS, to conquer the problem when the converter operates with light load. This paper discusses a new two-phase interleaved voltage converter Power Structure energy part plan through the combination of APS and conventional PWM interleaving controls. The APS control decreases the voltage weight of light load switches while the normal interleaving control holds up a heavy load of better working. Limit conditions are determined for switching between APS and conventional PWM interleaving control[10]. In order to conduct the aforementioned inspection, it recommends full control of power reach, which consolidates APS. The abilities of the converter are also checked via a misfortune breakdown test. Finally, the test results are reviewed.

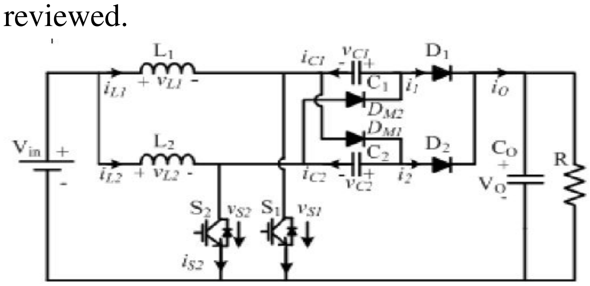

Fig.2. Structure of two-phase interleaved boost converter with voltage multiplier

II. DC–DC CONVERTERS:

The DC-DC converters are now updated for power conditioning purposes with the theory of the fuel cell requirements and operation studied. The first DC – DC converters are standard. Not only in applications in fuel cells, but even in standard applications are these converters used extensively. A segment which represents the topology in the context of DC – DC converters specially designed for fuel cell use is added after discussions of traditional converters.
[6, 7, 8].

A. Conventional Configurations

Figure demonstrates the typical configuration for the DC-DC boost converter for the fuel cell conditioner. 3. Although this configuration constitutes a popular boost topology, the design follows the specifications for electrical insulation[12]. Furthermore, the large gap of input and output puts intense stress on the switch. As shown in Figure, a full-bridge transducer. 4, is the most commonly used fuel cell power conditioning circuit configuration when electric insulation is required.

B. DC–DC Converters for Fuel Cells In fuel cell applications traditional fuel cell DC-DC converters are mostly used but not all fuel cell conditioning issues have been overcome. DC-DC converters are analyzed in the following sections, which are

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specifically intended for use in fuel cell power conditioning.

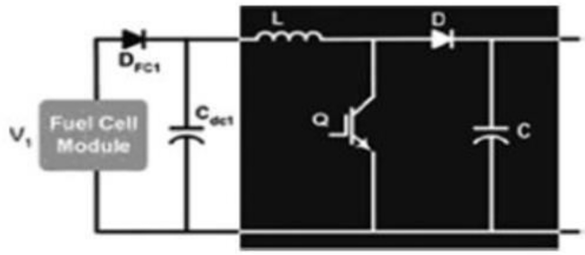

Fig.3. Non-isolated DC–DC boost converter for fuel cell power conditioning.

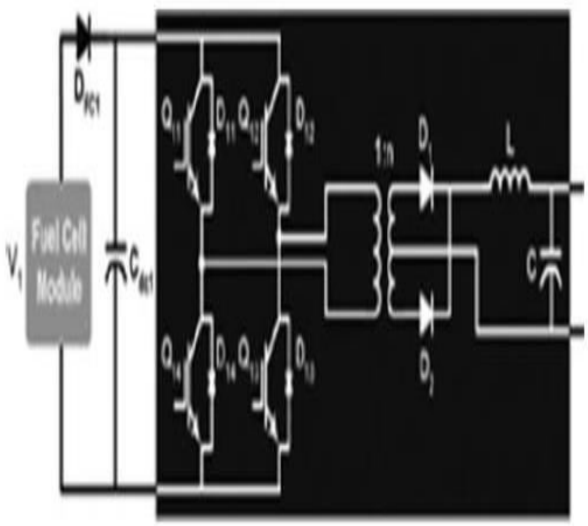

Fig.4. Isolated DC–DC full-bridge converter for fuel cell power conditioning

C. Modified Typical DC–DC Boost Converter:

Below are discussed some fuel cell power conditioning systems based on the conventional DC – DC boost converter, but which have adjusted the basic topology in part.

D. Full-bridge converter with multiple secondary coils:

A complete bridge converter with a number of secondary spindles is specified. As shown in Fig.5, a transformer with many sequentially connected secondary coils is used in topology. This topology full-bridge converter is able to achieve high performance ZVS. Further, if the right control algorithm is used to control the output voltage, this converter topology changes the phase. This converter can also work in constant voltage or with constant current, which gives the designer a great deal of flexibility. In second-hand transformer belt transformers, the converter uses electromechanical relays to control the voltage gain ratio. This makes a higher transformation ratio, if the pickup voltage of the fuel cell decreases as a result of increasing load.

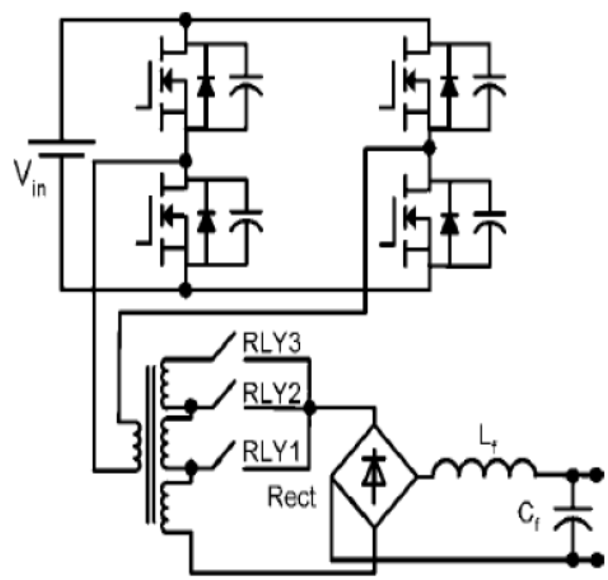

Fig.5. Full-bridge converter with multiple secondary coils

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E. Soft switching direct converter:

In Fig. a soft switching direct converter power-conditioning system is presented. 6. The fuel cell power for this power system is provided by a boost converter, battery, DC / DC converter, clamp circuit and a trois-phase inverter. The boost converter is used to tamp the differing DC voltage from the fuel battery and for the voltage control of the DC / DC converter and the battery. The soft, full-bridge switching DC / DC converter is composed of two H-bridge converters with intermediate high-frequency transformer to up to the appropriate voltage level, as seen in Fig7. Converters mounted in parallel with the MOSFET switch allow the ZVS and Zero Current Switch (ZCS) to be switched off. The implementation of these soft switching techniques allows the converter to perform more efficiently. Furthermore, the absence of a DC-link condenser offers a stronger power density, but results in more consideration for the configuration of the clamp circuit and less dynamic reliabilities in reaction to the standard DC-link condenser. The full-bridge output inverter converts the DC / DC output to and the battery to the required AC form.

III. SIMULATION RESULTS

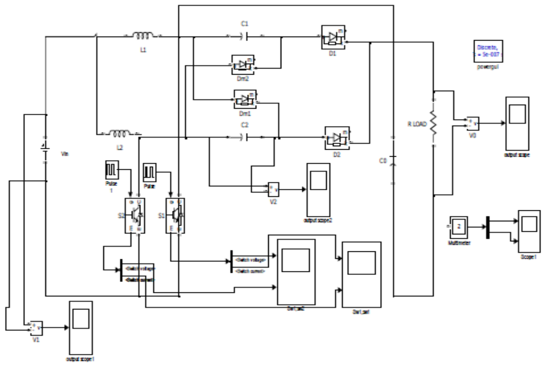

Fig.6. Proposed circuit in MATLAB

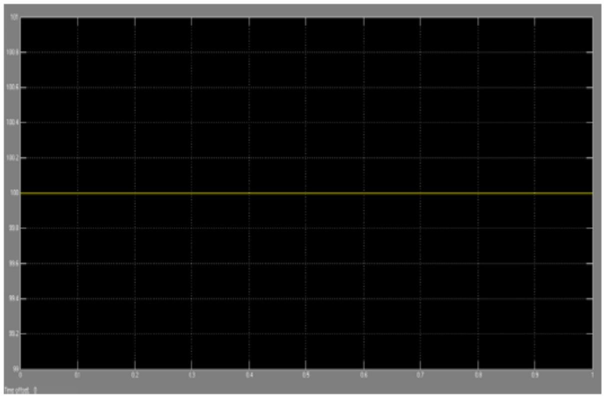

Fig.7. Simulated Waveform of Input Voltage

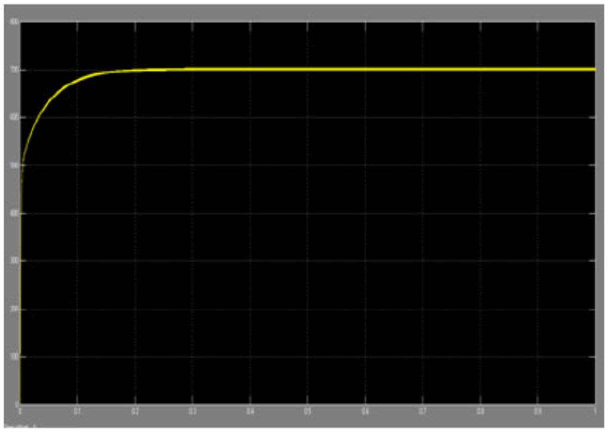

Fig.8. Simulated waveform of Load Voltage

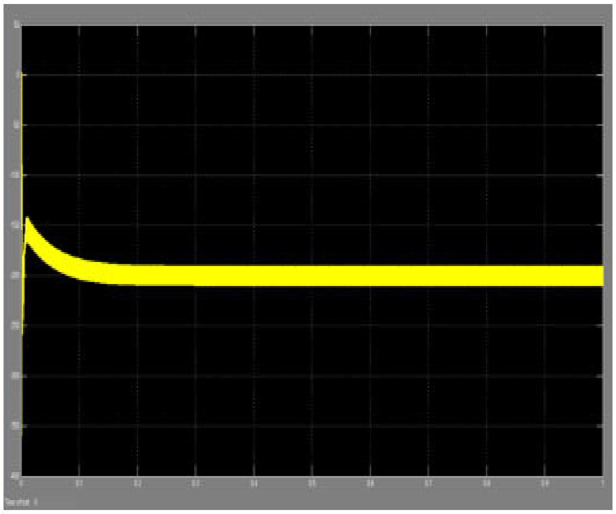

Fig.9. Simulated waveform of Capacitor C_2 Voltage.

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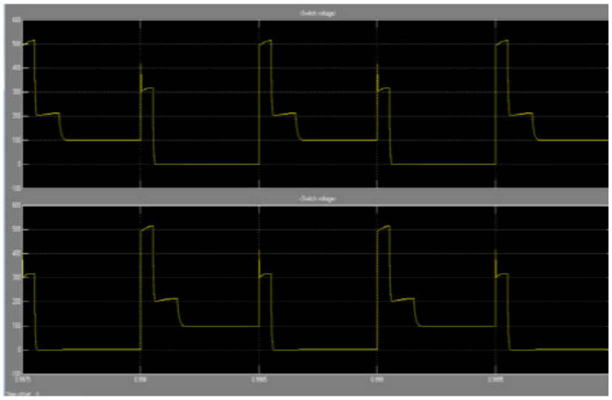

Fig.10.Simulated output waveforms of Switching Voltages at Diode

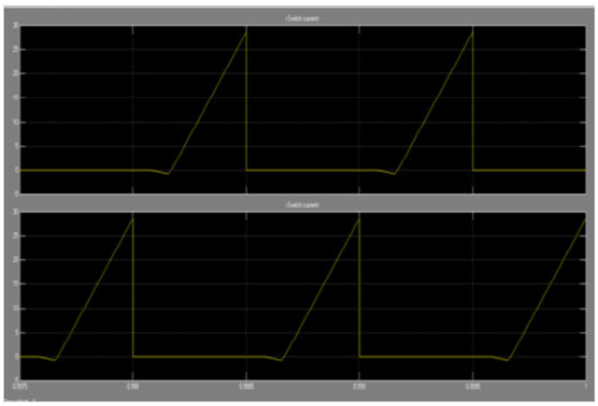

Fig11. Simulated output waveforms of Switching Currents at Diode

IV. CONCLUSION

Interleaved high-step DC to DC converter output characteristics are evaluated when mixing fuel cell and grid. Calculated APS regulation limit condition and conventional control scheme. In light conditions, designing alternating phase shift control schemes is very straightforward. Under heavy load conditions, conventional control scheme prefers. Both operate in different conditions, reducing tension on switching power electronic devices.

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