

## High Power Application of Cockcroft Voltage Multiplier Converter Based Three Phase Inverter

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**Abstract:** The DC-DC converter converts the low dc input voltage to high voltage without using step up transformer. The Cockcroft voltage multiplier uses the diode and capacitor is to increase the potential at the output of the converter. The proposed converter is connect to the three phase inverter and feed into the AC application. The pulse width modulation is used to control and regulate the voltage and current of the inverter. The voltage and current of three phase inverter simulation are verified using the MATLAB Simulink Software.

**Key words:** Cockcroft Walton (CW), Pulse Width Modulation (PWM), three phase inverter, capacitor, application, modulation

### INTRODUCTION

The conventional DC-DC converter produce the high voltage by giving high duty cycle but in proposed converter has produces high voltage (Muller and Kimball, 2016; Luo and Ye, 2004). The pulse generator is fed to the converter and the passive component is used to improve the gain of the voltage. In presently various converters are used to produce the high gain and reduce the ripple across the passive component (Weiner, 1969). The constant dc supply is feed into the Cockcroft Walton voltage multiplier circuit based on the three phase inverter for AC application (Walker and Sernia, 2004). The voltage is increased and has steady output at the dc voltage and the harmonics will be reduced compared to the conventional converter. In this study described that the PV inverter topology it is a high efficiency topology (Bavitra *et al.*, 2015). Firefly algorithm is presented in this study in this algorithm used to generate the reactive power (Kannan *et al.*, 2015).

### MATERIALS AND METHODS

The proposed converter has designed by the parallel connection of two diodes and the capacitor is added in between them. The capacitor is used to increase the voltage and it will act as the transformer because the switch in the converter turn off and the capacitor discharged the power and it will add to the supply side voltage. The output voltage of the inverter has generated high voltage gain. The block diagram of proposed converter is shown in Fig. 1 and 2 shows

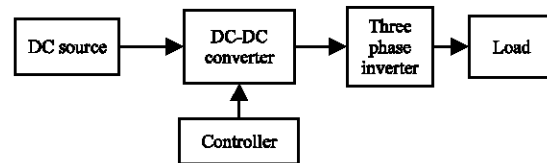


Fig. 1: Block diagram of proposed circuit

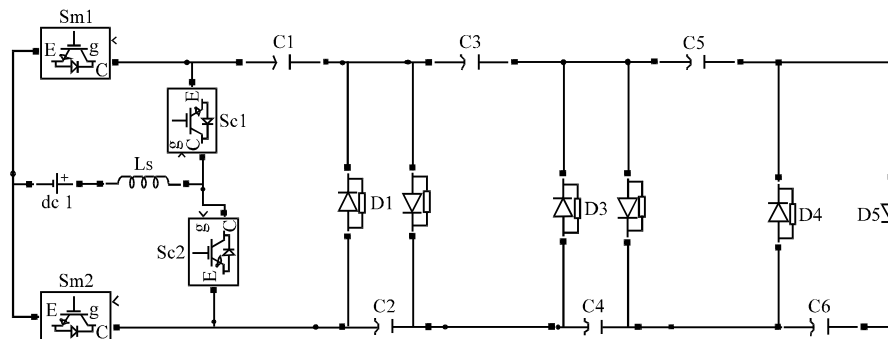


Fig. 2: Proposed DC-DC converter

the circuit diagram of the proposed DC-DC converter. The proposed converter operated in various modes:

- Mode 1; during this mode all the diodes are not conducted and the capacitor C6, C4 and C2 are supply to load and the remaining capacitors are floating
- Mode 2; during this mode the diode D6 is conducting and the capacitor C6, C4 and C2 are charged and the remaining capacitors are discharged through the diode

- Mode 3; during this mode the diode D4 is conducting and the capacitor C4 and C2 are charged and C1 and C3 are discharged
- Mode 4; during this mode the diode D2 is conducting and the capacitor C2 is charged and the C3 and C4 are supply to the load current

**RESULTS AND DISUSSION**

The overall simulation diagram is shown in Fig. 3. The voltage across the DC-DC converter is shown in Fig. 4.

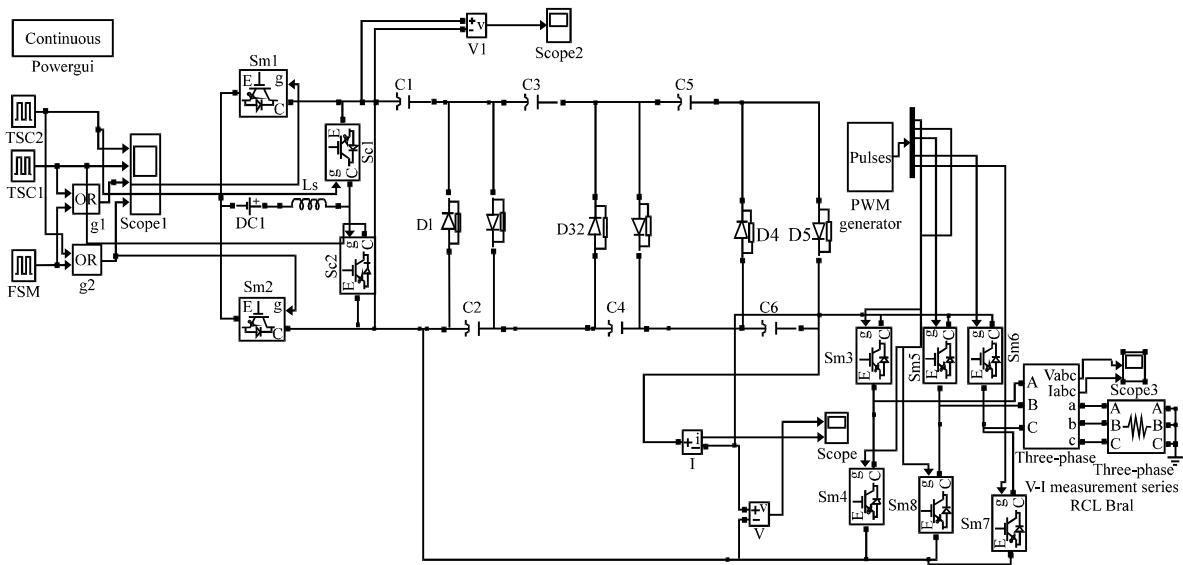


Fig. 3: Proposed simulation circuit

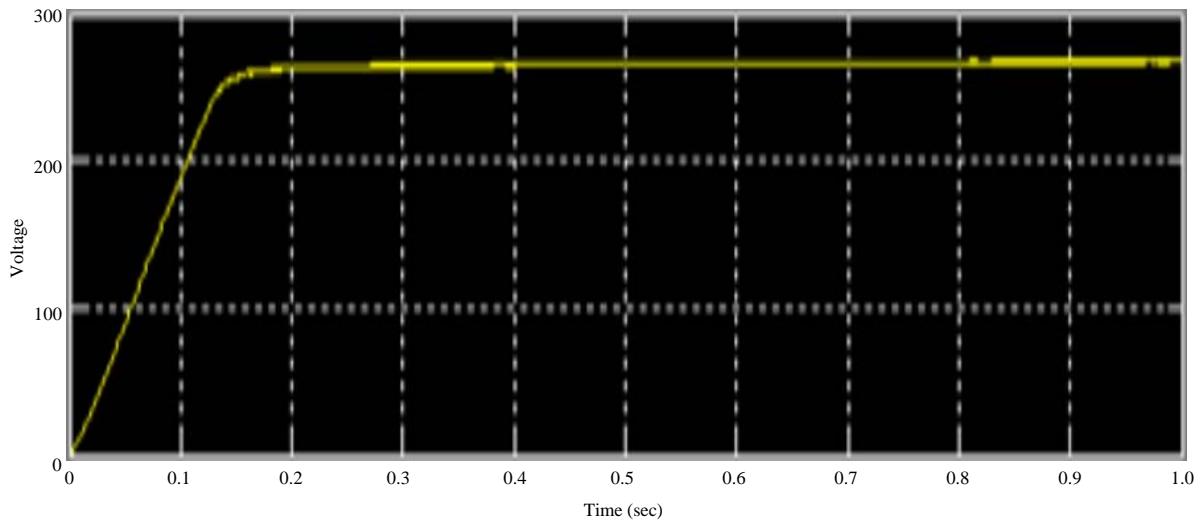


Fig. 4: Output voltage waveforms for converter

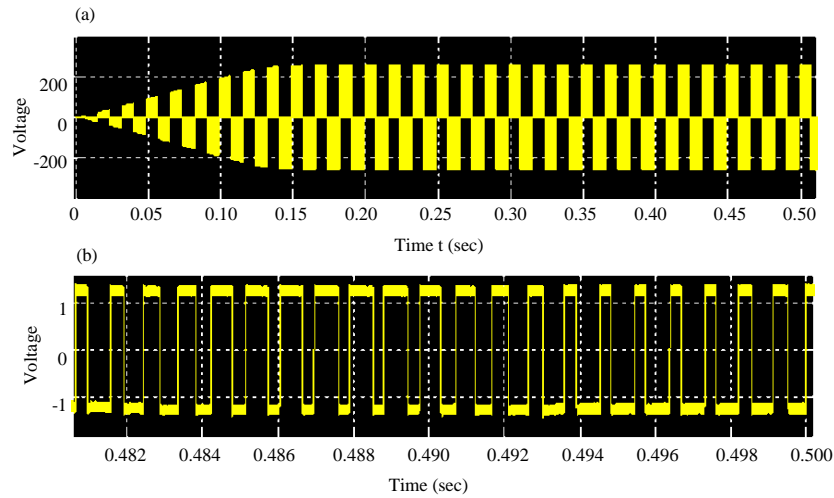


Fig. 5: a, b) Output voltage and current waveform for R load condition

The inverter voltage and current is shown in Fig. 5. The output voltage and current wave form of inverter is taken for resistive load condition.

### CONCLUSION

The high gain Cockcroft Walton voltage multiplier has analyzed in the proposed method. The proposed converter has three stages for AC load application. Every stage of the voltage multiplier has maintained the same potential and produce ripple less output and also produce continuous current at the output.

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