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Single Phase Cyclo Inverter Based On Capacitor Start Induction Motor

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ABSTRACT: This paper presents a power converting technique at supply frequency to a higher frequency using a cyclo inverter circuit. IGBT used as a switching element in the cyclo-inverter circuit. This circuit is used in induction heating high-frequency applications as well as high -speed induction motors. The triggering pulses are generated at any frequency which is an integer multiple of supply frequency. In this paper using a single phase capacitor start induction motor for developing high- speeds with high frequency power.

KEYWORDS: Cyclo Inverter Circuit, Capacitor Start Induction Motor, MATLAB/SIMULINK.

I. INTRODUCTION

Fast improvements in the field of energy electronic devices have led to the accessibility to a variety of inverter tour, different in outcome regularity and volts. The source of such tour is a single stage link inverter routine, but its outcome is not sinusoidal and contains harmonics. Hence, resounding inverters are used where how often is much greater, at around 100KHz, with the best quality but since the change provides the full current for a longer time, the device ranking has to be greater.

Variable volts and different regularity ac engine pushes have come to improved use in various commercial programs. These new techniques need a simple method of management for ac engines. A cyclo-inverter is a type of energy management in which a changing volt at supply regularity is transformed straight to an changing volts at fill regularity without any advanced d.c stage. The cyclo-inverter is managed by managing the shooting impulses so that it generates a changing outcome volt. By managing how often and detail of stage modulation of the shooting perspectives of the converters, it is possible to manage how often and plenitude of the outcome volts. Thus, a cyclo-inverter has the service for ongoing and separate control over both its outcome regularity and volts. The quality of outcome volts trend and its harmonic distortions also encourage the limitation on this regularity. The distortions are very low at the low outcome regularity. Here, a cyclo-inverter is recommended where the IGBT change is self-commutated and hence removes the need for a commutation routine. The recommended cyclo -inverter is then used to energy a capacitor start introduction engine and its efficiency is simulated in MATLAB.

II. PROPOSED CONVERTER

The figure out 1 below reveals the specific routine of the suggested ripper. It created an individual stage transformer with mid tap on the secondary twisting and four thyristors, without any circulation of distributing present. Two of these thyristors P1, P2 are for the beneficial team and the other two are for the adverse team. The fill is linked between the additional twisting and international airport A as proven. An outcome is acquired through appropriate transmission of IGBTs in the two feedback periods. The IGBTs are shot according to a pattern based upon on the integer several with which they provide regularity is to be increased. Thus, the production of the ripper will have regularity,

$$f_o = f_i \times N_r$$

Where Nr is an integer and fi is the origin regularity.

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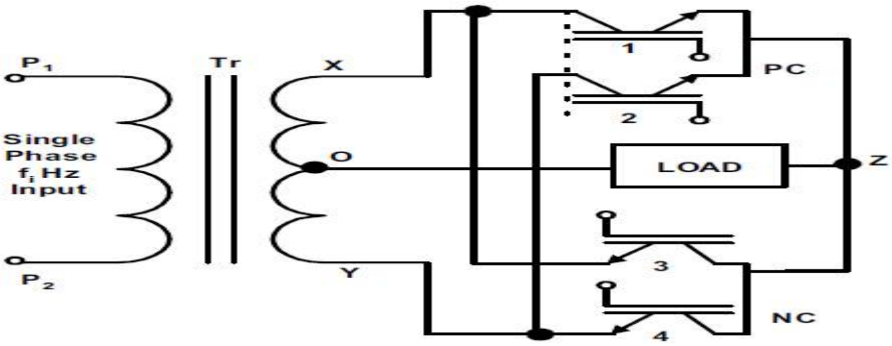

Figure: 1- mid-point cyclo-inverter

III.CAPACITOR START INDUCTION MOTOR

Capacitors are used to improve the starting and running performance of the single-phase inductions motors. The capacitor start induction motor is also a split phase motor. The capacitor of suitable value is connected in series with the auxiliary coil through a switch such that I_a the current in the auxiliary coil leads the current I_m in the main coil by 90 electrical degrees in time phase so that the starting torque is maximum for certain values of I_a and I_m. This becomes a balanced 2- phase motor if the magnitude of I_a and I_m are equal and are displaced in time phase by 90° electrical degrees. Since the two windings are displaced in space by 90 electrical degrees as shown in Fig. 2 maximum torque is developed at the start. However, the auxiliary winding and capacitor are disconnected after the motor has picked up t5 percent of the synchronous speed. The motor will start without any humming noise. However, after the auxiliary winding is disconnected, there will be some humming noise.

Since the auxiliary winding and capacitor are to be used intermittently, these can be designed for minimum cost. However, it is found that the best compromise among the factors of starting torque, starting current and costs results with a phase angle somewhat less than 90 between I_m and I_a. A typical torque-speed characteristic is shown in Fig. 5.6 (c) high starting torque is an outstanding feature.

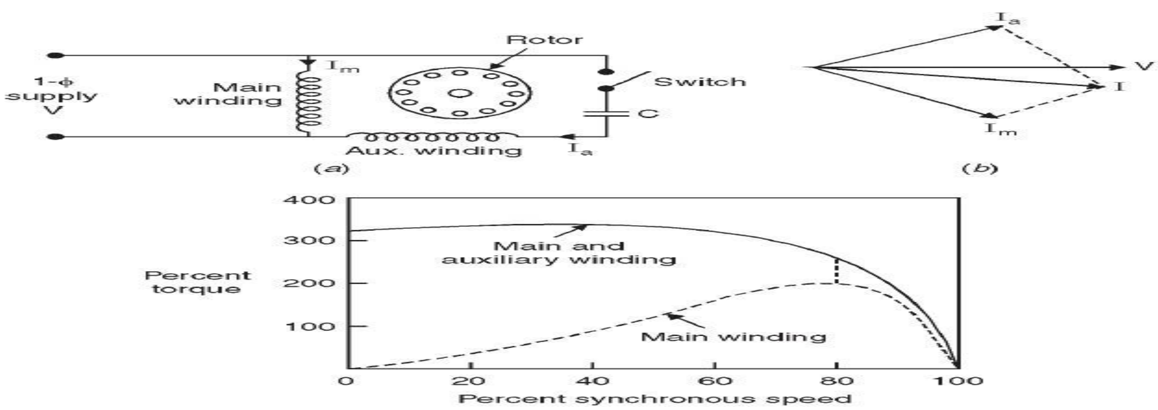

Figure: 2.. Capacitor start motor (a) Connection (b) Phasor diagram at start (c) Speed torque curve.

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IV.SIMULATION RESULTS

Let X1 symbolizes the impulses at a regularity of 50 Hz and X2 of 150 Hz. Then adding of X1 and X2 will outcome the impulses needed by the IGBT T1. Further, if this X2 is upside down by a NOT checkpoint, then the Adding of X1 and X2' will outcome the impulses needed by the IGBT T4. In the same way, the Adding of X1' and X2 outcome the impulses required by IGBT T2 and then adding the X1' and X2' lastly gene-rates the essential impulses needed for IGBT T3.

The impulses created by the heartbeat trend creator routine are usually at low energy. They may not be able to induce the gadgets into transmission if fed straight. These impulses are therefore enhanced to great energy by a routine known as car owner routine.

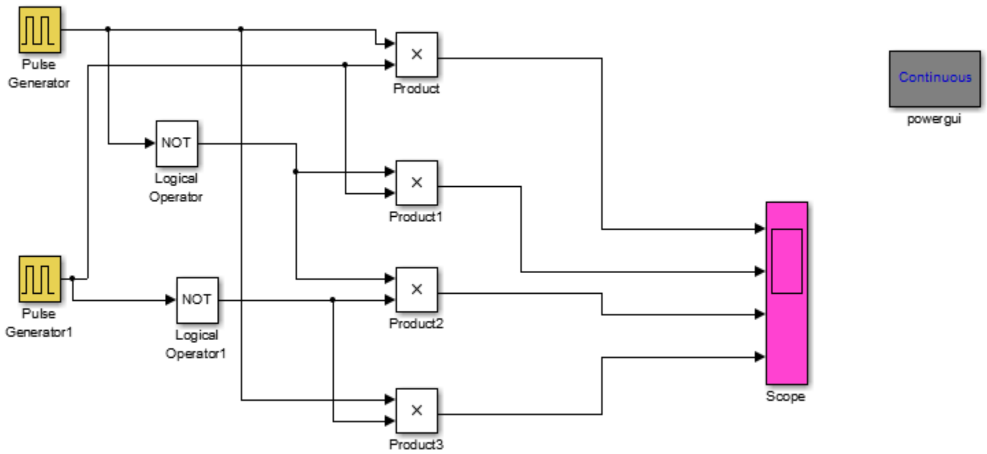

Figure:3- triggering pulses circuit

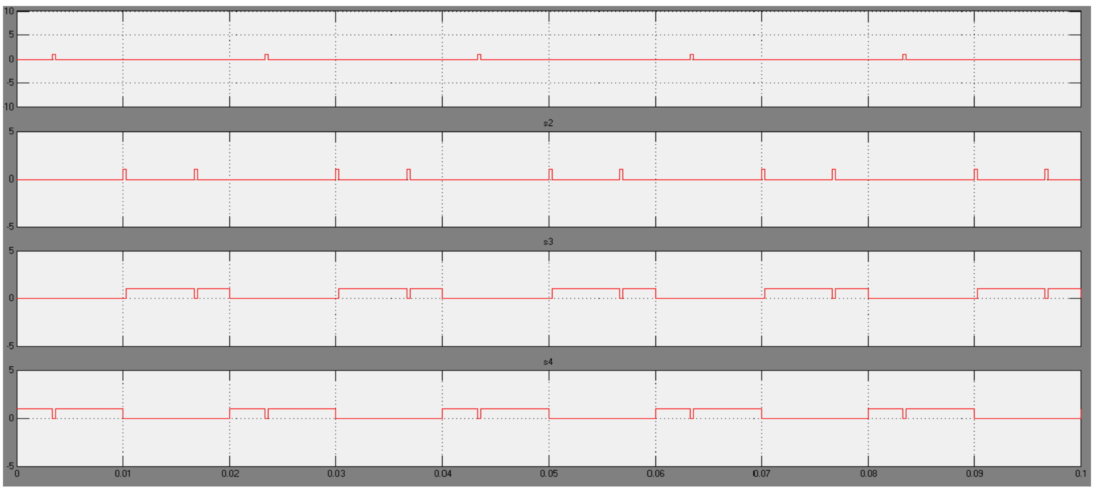

Figure:4 Triggering pulses for IGBTs

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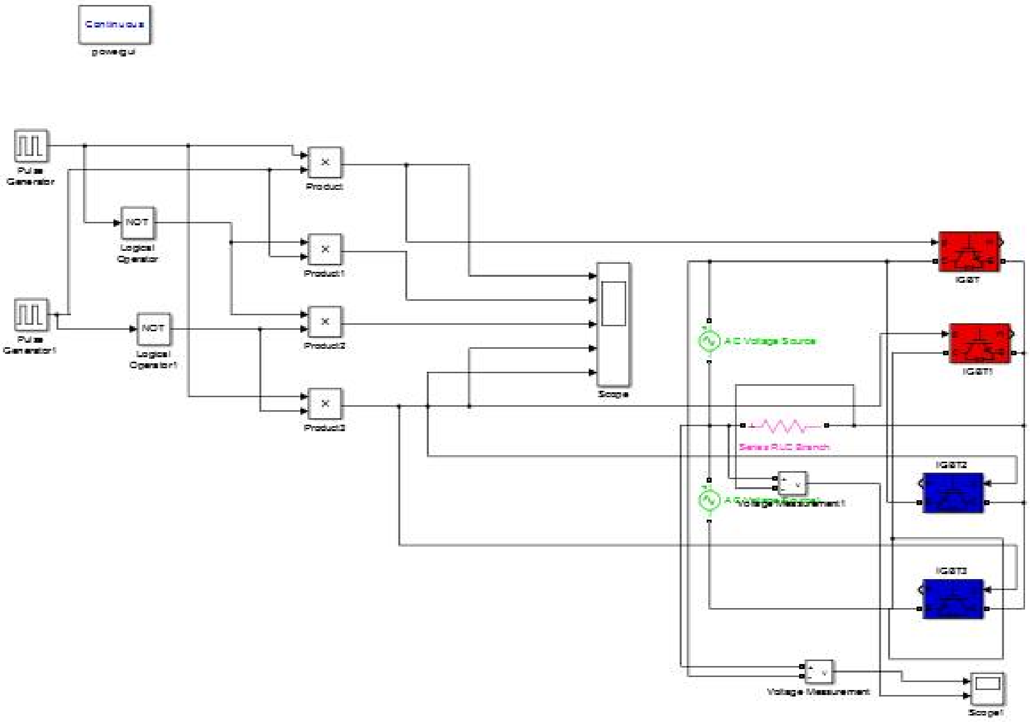

Figure:5 cyclo-inverter circuit

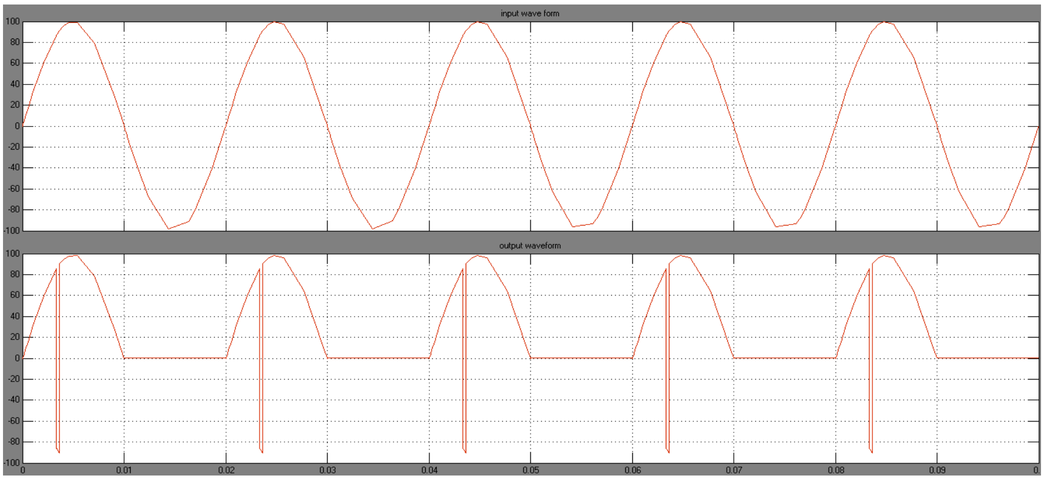

Figure:6- Input and output waveform of cyclo-inverter

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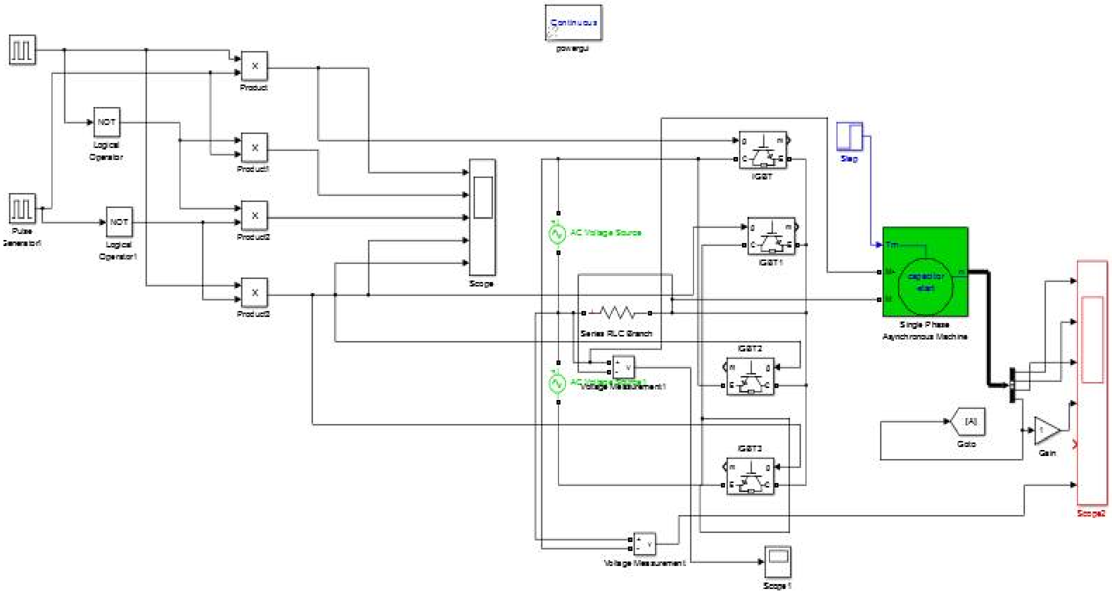

Figure:7- IGBT Based cyclo-converter run induction motor

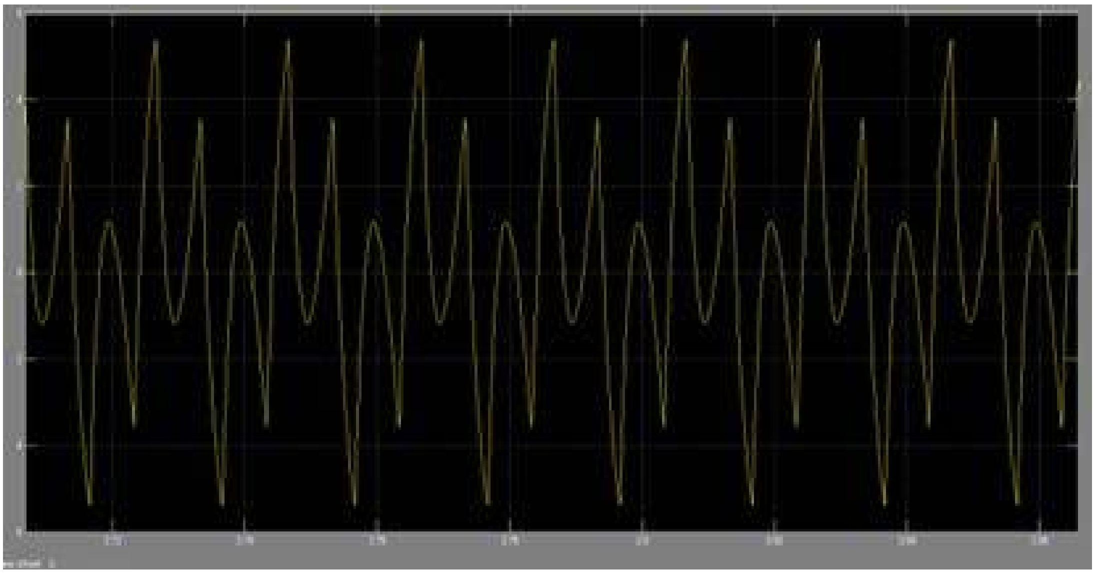

Figure:8. speed

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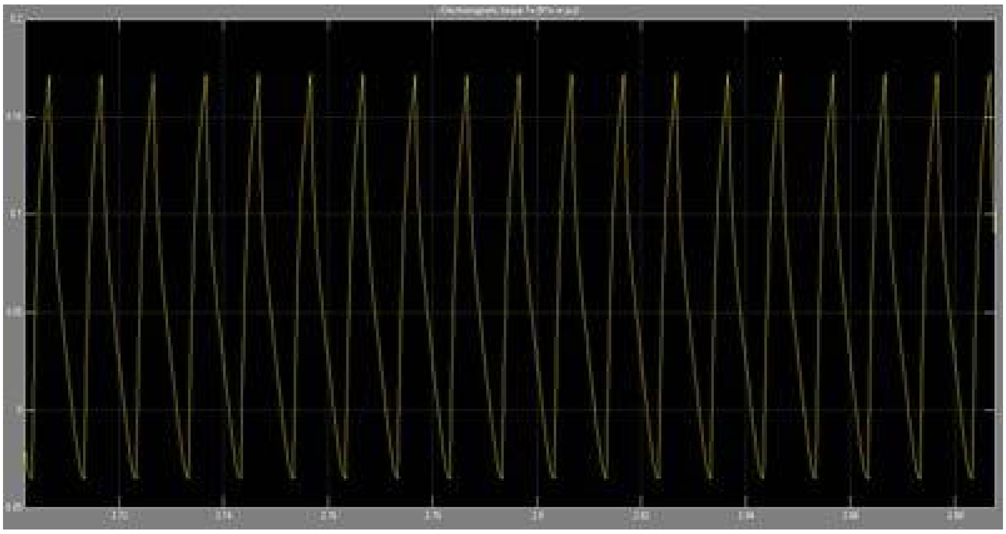

Figure:9 Torque

V.CONCLUSION

The cyclo-inverter routine was developed and simulated and desired results are acquired. An individual stage cyclo-inverter was used for controlling a capacitor begin individual stage introduction engine to generate torque features which fit with requirement twisting characters-tics. This different regularity of cyclo-converter is also useful to replace flywheel from the working device which cuts down on a cause of torsion vibrations and exhaustion harm to the device.

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