An energy Storage using Cascaded Multilevel Inverters by PMSM with Autonomous Power Regernarative Control System

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Abstract - The energy storage devices are better in a motor drive system. The power distribution strategy for energy source, and energy storage, electric motor under various operation modes. This paper develops energy storage not implementing harmonic compensation in whole operating condition, also consisting peak power during acceleration absorbing regenerative power during deceleration, while comparing the PSMM we can obtain the better response under different operation modes.

I. INTRODUCTION

For the higher half of the twentieth century electrical(EVs) are through of designed developed to suit a spread of application from construct cars to advanced military vehicles. The latest enhancement au fait systems, transducers and amp instrumentation on and good vehicles technology square measure enabling vehicles to be a lot of machine controlled. Some states have required rules proposing a minimum range of cars p,a with zero emission which may be set by the EVs MLI topologies used within the motor drive trade to run induction machine prime power and high voltage configuration this can be devides. Neutral point clamped converter (NPC) MLI,Fixed capacitance(FC) MLI,cascade h- bridge (CHB) MLI, catered to a decent kind of application. The CHB MLI is probably only fairly multilevel converter where the individual energy sources (capacitors, battries etc) square measure typically totally isolated DC source.

The MLI may be a distinctive style of electrical converter that's standard for top power application that doesn't essentially want stringing along varied power source to use high voltage. A number of salient options embody modularity flexibility and extended management over the system design what was troublesome earlier in terms of ended management mistreatment microprocessor or microcontroller has become easier due to of DSPs and FPGAs.

II. POWER DISTRIBUTION STRATEGY AND SYSTEM DISCRIPTION

The cascaded H-Bridge (CHB) MLI may be cascaded of H- Bridge or H-Bridge in a very series configuration. A CHB MLI consists of a string of H- Bridge electrical converter units in every of its three phases. Associate degree example of a CHBMLI. One H- Bridge converter, one section full bridge electrical converter employed in unipolar PWM. Advantages are the series structure permits a ascendible, modularized circuit layout and packing since every bridge has a similar structure. Needs minimum range of parts considering there are not any additional clamping diodes or voltage equalization capacitors. A very flexible ability is achieved because the modulator in the system allows a racked up structure. The main inverter and auxiliary inverter respectively for example large number of cells may help to increase power quality and required power compensation capability. Although it also leads to an extra device count, a complicated control system with high cost.

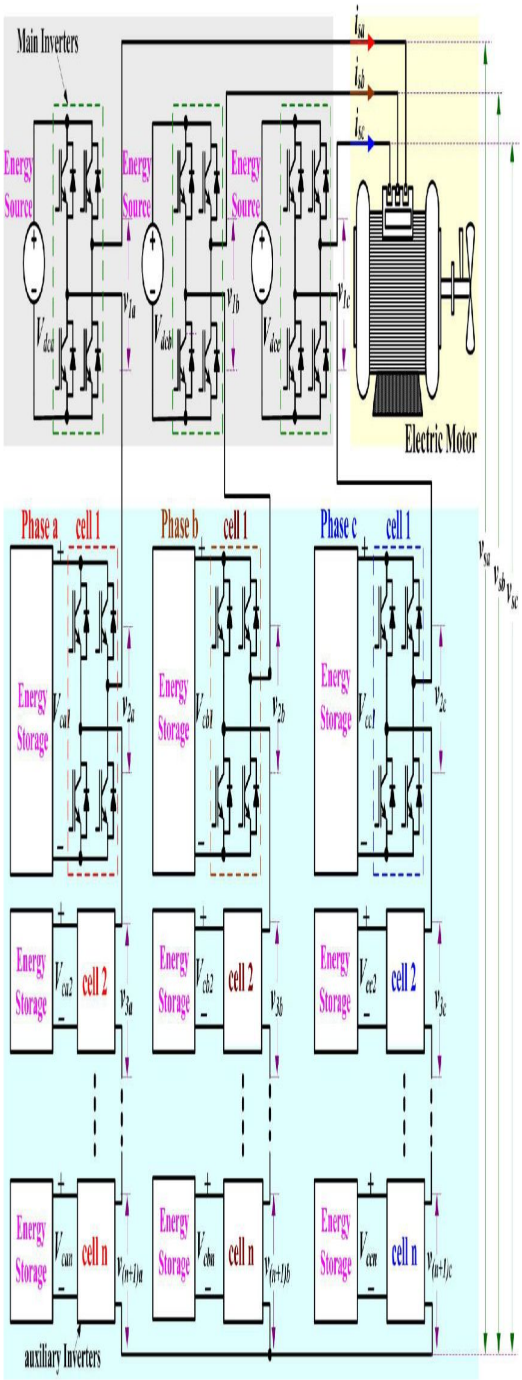

Fig 1. Proposed cascaded multilevel inverter based motor drive with segmented energy storage

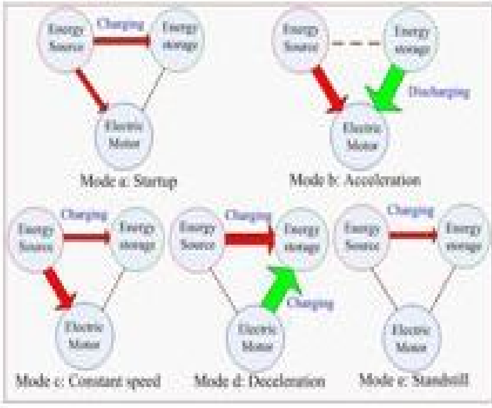

Fig 2. Power flow the energy source, the energy storage and electrical motor in different modes

III. AUTONOMOUS POWER REGENARATIVE CONTROL SYSTEM

According to management control ways in which are loosely divides into scalar and vector management ways, in scalar management depends on relationships valid in steady state, alone magnitude and frequency of voltage, current and flux linkage house vectors area unit controlled. The vector management depends on flexible and general management philosophy. It's supported relations for dynamic states, not alone magnitude and frequency but in addition quick position of voltage, current and flux house vector area unit controlled. This vector management acts on the positions of the house vectors and provides their correct orientation every in steady state and through transients.

The most accepted technique spoken as field oriented management or vector management and offers the induction motor an PMSM and this approach is explored. At intervals the vector management methodology the equation governing the motor area unit reworked into an organization that rotates in synchronization with the rotor flux vector with new co-orientation referred to as field co-ordinates. When compared with IMs, the initial constant value of computer flux in PMSMs is not zero and is instead keen about the rotor position in motion senor less PMSM drives .The initial position of the router is not noted and this sometimes causes troubles like initial backward rotation force ripple and problems with synchronous for non silent (with surface mounted magnets) PMSMs reliable position estimation is harder than for silent (with buried or inserted magnets)construction where the initial position are calculated terribly very definitive manner by exploiting the bowed inductions variation for a non silent PSM to start with high weight lots and essay low pass filter instead of a preinstument at intervals the flux skilled is also used. This solves the matter of flux initial conditions.

The PSMM (PHASE SHIFT MODULATION METHOD) this method can apply very well to CHB inverters a brief description about these methodology in general a m-level MLI then triangular carries (m-1) the PSMS may be higher illustrated by associates degree

IV. SIMULATIONS AND RESULTS

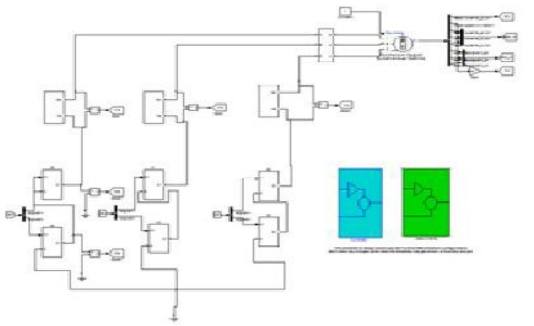

Figure shows proposed cascaded-multilevel-inverter-based motor drive withsegmented energy storage

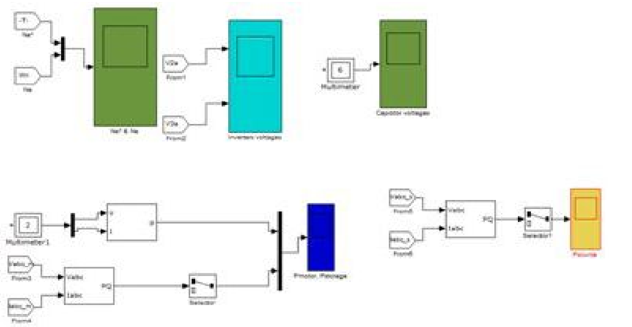

Figure shows proposed power flow control system

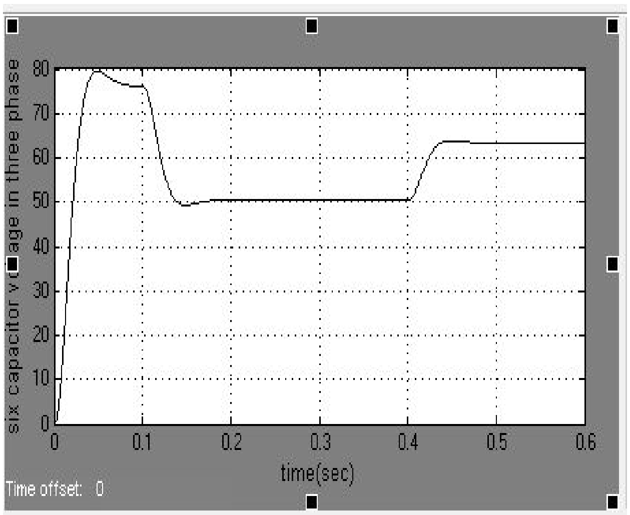

Figure shows Simulation results of proposed motor drive Pmotor & Pstorage

In this capacitor voltage start before acceleration mode 0V after acceleration it will reaches 75V, during discharge it will reaches 75V to 51.5V, during deceleration period capacitor recover the regenerative energy from the PMSM, so the capacitor voltage increase 51.5V to 62.5V.

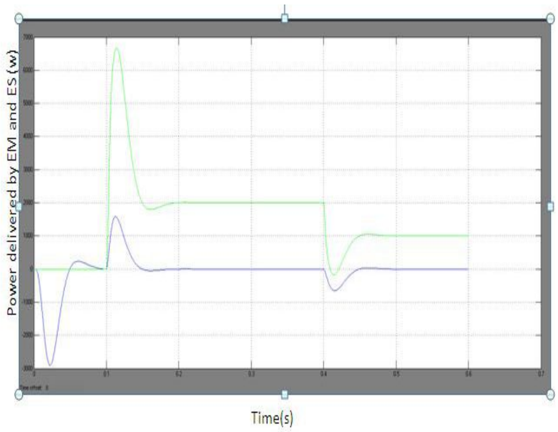

Figure Simulation results of proposed motor drive Pmotor & Pstorage

In this power deliver by electric motor and energy storage $P_{Motorid}$ is increase 4200W to 6800W $P_{Storage}$ Decrease -3500W to -600W after deceleration it will reaches to normal position

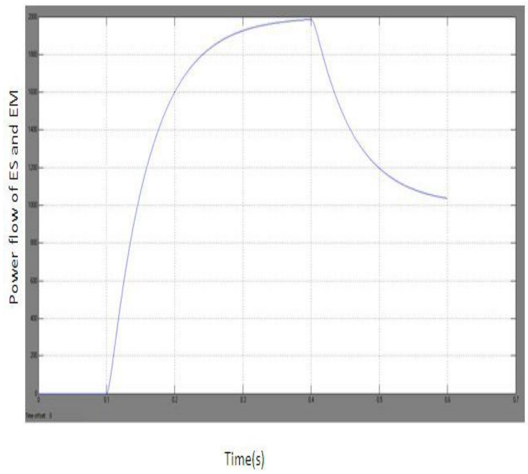

Fig shows Simulation results for P_{Source}

In this power flow between the energy storage and electrical motor since there is no overshoot voltage, fast dynamic response, it can be applied for heavy duty electric vehicle along with the other applications to improve the system stability and power quality.

V. CONCLUSION

This paper has planned a cascaded MLI based motor drive system with mesmeric energy storage parts. In the planned motor drive system the energy storage has been designed not solely to supply harmonic compensation but additionally to be capable of its regenerative energy throughout the swiftness mode and reapplying this energy throughout acceleration transients. A power distribution strategy between the energy supplies the energy storage and therefore the motor has been developed and enforced by a planned autonomous power regenerative system. During this system the voltage equalization management of the energy storage has been demonstrated to be very important for power distribution system stability and dependabity. It seems that the planned motor drive system is applied to heavy duty electric vehicle and alternative application to boost system efficiency, and dynamics and power quality.

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