ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

A New Cascaded Multilevel Inverter And Segmented Energy Storage Fed PMSM Drive With Autonomous Power Regenerative Control

B.Venkatagireesh
M.Tech Student,
Department of PEED,
KORM College of Engineering.

M.Reddy Prasanna
Assistance Professor,
Department of EEE,
KORM College of Engineering.

Dr.B.Mouli Chandra
Associate Professor HOD,
Department of EEE,
KORM College of Engineering.

ABSTRACT:

The energy storage devices are better ina 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 and absorbing regenerative power duringdeceleration, whilecomparing the PSMM we can obtain the better response under different operation modes.

Index Terms:

PMSM, Cascaded MLI, Segmented Energy Storage, Regenerative Control.

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 measureenabling vehicles to be a lot of machine controlled. Somestates have required rules proposing a minimum range of cars p,awith zero emission which may be set by the EVsMLI topologies used withinthe motor drive trade to run induction machine prime power and high voltage configuration this can be devides. Neutralpoint 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'tessentially 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.PROPOSED SYSTEM:

II. POWERDISTRIBUTION 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. OneH-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 modulatorin 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.

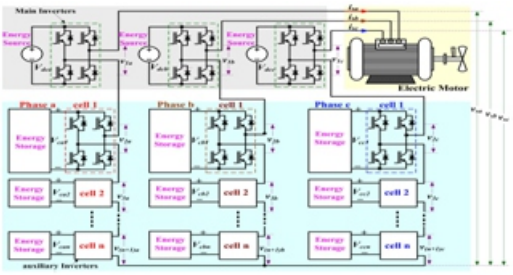


Fig 1. Proposed cascaded multilevel inverter based motor drive with segmented energy storage

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

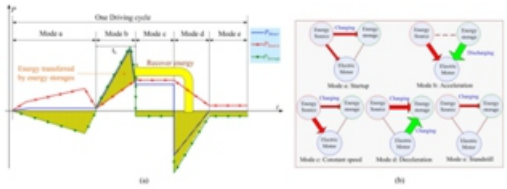


Fig 2. Power flow the energy source, the energy storage and electrical motor in different modes

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 relationshipsvalid in steadystate,alone magnitude and frequency of voltage, current and flux linkage house vectors area unit controlled. The vector management dependson flexible and general management philosophy. It's supported relations for dynamic states, not alone magnitude and frequency but in addition quick position of voltage, currentand 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 initialposition of the router is not notedand this sometimescauses troubles like initialbackward 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 exploitingthe 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 initialconditions.

The PSMM (PHASE SHIFT MODULATION METHOD) thismethod 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 illustratedby associates degree.

IV. MATLAB CASE STUDY AND SIMULATION RESULTS:

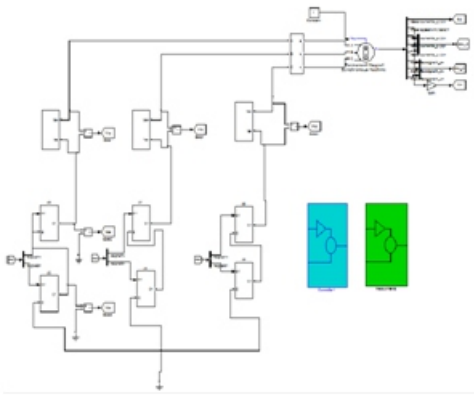


Fig 3: Proposed cascaded-multilevel-inverter-based motor drive with segmented energy storage.

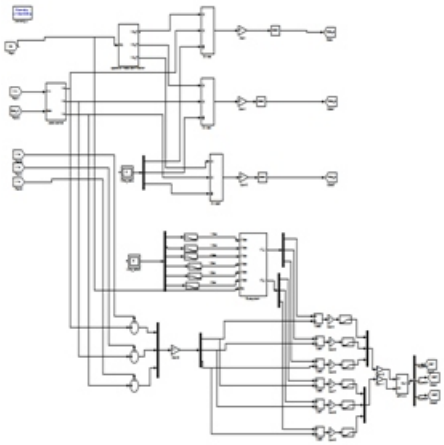


Fig 4: Proposed control strategy

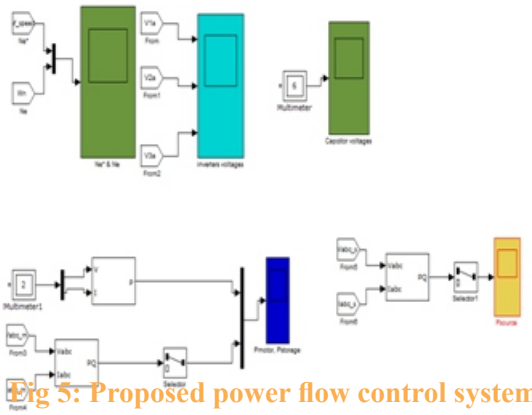


Fig 5: Proposed power flow control system

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

The ordinary and proposed MATLAB/Simulink models were produced for PMSM. The motor is worked in consistent torque of 10N.m mode. In the outlined model for execution diverse operation modes by utilizing self-sufficient power regenerative control system and store recouped regenerative energy in a energy using so as to stockpile UC's

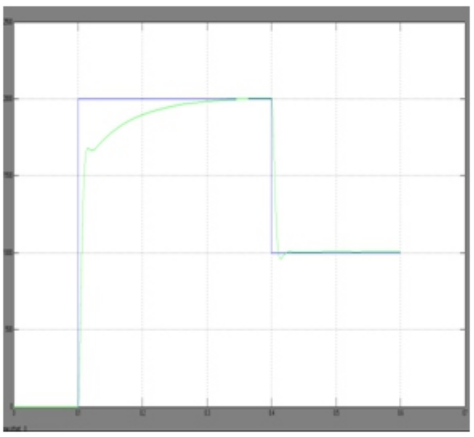


Fig 6: Simulation results of proposed motor drive Speed response

The rate dynamic reaction when the pace charge N*e changes from 0 to 2000 r/min at 0.1 s and afterward back to 1000 r/min at 0.4 s. The genuine rate Ne takes after N*e quick and easily.

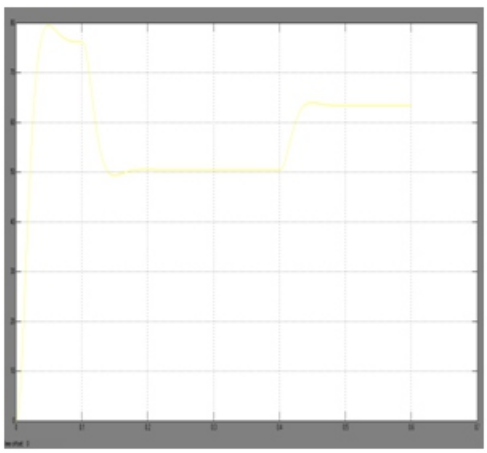


Fig 7: Simulation results of proposed motor drive six capacitor voltages of three phases

In this capacitor voltage begin before speeding up mode 0V after quickening it will comes to 75V, amid release it will comes to 75V to 51.5V, amid deceleration period capacitor regenerating the regenerative energy from the PMSM, so the capacitor voltage build 51.5V to 62.5V.

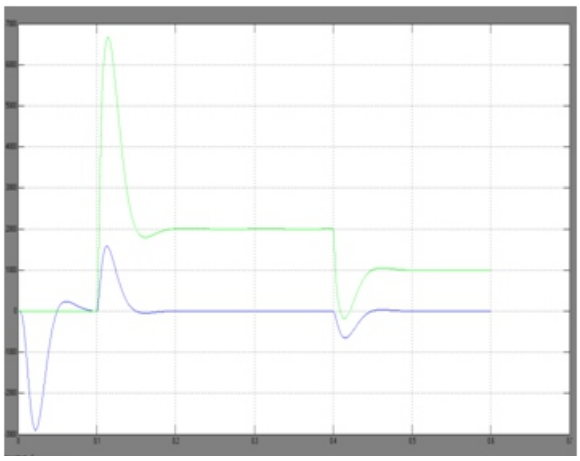


Fig 8: Simulation results of proposed motor drive Pmotor&PStorage

In this power convey by electric motor and energy storage PMotor is expansion 4200W to 6800W PStorage Decrease - 3500W to - 600W after deceleration it will reaches to typical position.

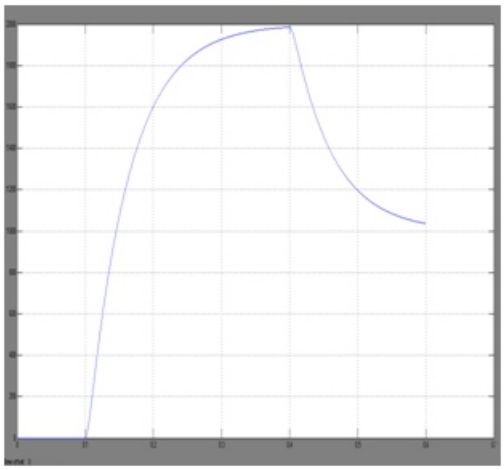
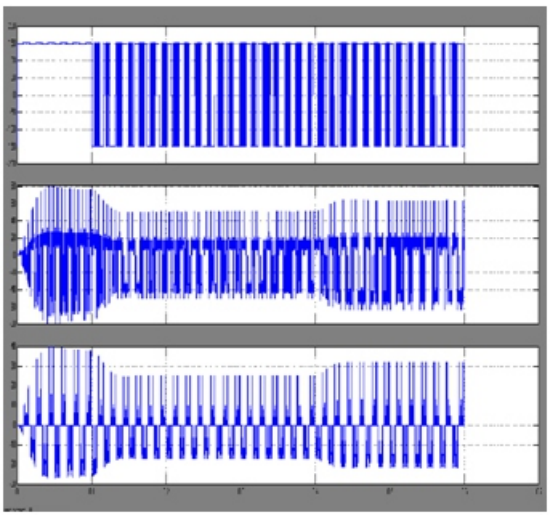


Fig 9: Simulation results for PSource

In this power stream between the energy storage and electrical motor since there is no overshoot voltage, quick element reaction, it can be connected for substantial obligation electric vehicle alongside alternate applications to enhance the system solidness and power quality.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal



10: simulation results of inverter voltages

V. CONCLUSION:

This paper has planned a cascaded MLI based motor drive system with mesmericenergy storage parts. In the planned motor drive system theenergy storage has been designed not solely to supply harmonic compensation but additionallyto be capable of its regenerative energy throughout the swiftness mode and reapplying this energy throughout acceleration transients. A power distribution strategy between the energy suppliesthe 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 andpower quality.

REFERENCES:

[1] S. Kim and S. Sul, "Control of rubber Tyred Gantry Crane with energy storage based on supercapacitor bank," IEEE Trans. Power Electron.,vol. 21, no. 5, pp. 1420–1427, Sep. 2006.

[2] F. Z. Peng, H. Li, G. J. Su, and J. Lawler, "A new ZVS bidirectional dc–dc converter for fuel cell and battery applications," IEEE Trans.Power Electron., vol. 19, no. 1, pp. 54–65, Jan. 2004.

[3] E. B. Planes, N. L. Rey, J. Mosquera, F. Orti, J. A. Oliver, O. Garcia, F. Moreno, J. Portilla, Y. Torroja, M. Vasic, S. C. Huerta, M. Trocki, P. Zumel, and J. A. Cobos, "Power balance of a hybrid power source in a power plant for a small propulsion aircraft," IEEE Trans. Power Electron., vol. 24, no. 12, pp. 2856–2866, Dec. 2009.

[4] S. Lu, K. Corzine, and M. Ferdowsi, "A new battery/ultra capacitorenergy storage system design and its motor drive integration for hybrid electric vehicles," IEEE Trans. Veh. Technol., vol. 56, no. 4, pp. 1516–1523, Jul. 2007.

[5] P. Garcia, L. M. Fernandez, C. A. Garcia, and F. Jurado, "Energy management system of fuel-cell-battery hybrid tramway," IEEE Trans.Ind. Electron., vol. 57, no. 12, pp. 4013–4023, Dec. 2010.

[6] L. Solero, A. Lidozzi, and J. A. Pomilio, "Design of multiple-input power converter for hybrid vehicles," IEEE Trans. Power Electron., vol. 20, no. 5, pp. 1007–1016, Sep. 2005.

Author Details:

B.Venkatagireesh received the B.Tech degree in Electrical and Electronics Engineering from NIST,RajampetKadapa, India in 2013. Currently he is pursuing his Master Degree in the department of Power Electronics & Electrical Drives in KORM College of engineering, kadapa. His interests include Power Converters and Drives.

M.Reddy prasanna received the B.Tech degree in Electrical and Electronics Engineering from SKIT, RENIGUNTA,india. She received M.Tech degree from KSRMCE, Kadapa She is presently working as a Assistant professor of Electrical and Electronics Engineering of KORM College of engineering, Kadapa.

Dr.B.Mouli Chandra received the B.Tech degree in Electrical and Electronics Engineering from JPNCE, Mahaboobnagar,india, in 2004. He received M.Tech degree from RGMCET,Nandyal, in 2007 and Ph.D degree from JNT University, Hyderabad, india, in 2015. He is presently working as a Associate professor and HOD of Electrical and Electronics Engineering of KORM College of engineering, Kadapa. He has published 5 technical journals and 18 conferences proceedings.