Dual-Way Electric Traction Drive For An Ultracapacitor Pack

B. HARI KRISHNA
M.Tech Student, Dept Of PE&ED
Priyadarshini Institute Of Technology
Kanuparthipadu ,Nellore
Andhra Pradesh, India.

M. SANKAR BABU
Assistant Professor, Dept Of EEE
Priyadarshini Institute Of Technology
Kanuparthipadu , Nellore
Andhra Pradesh, India.

Abstract: **A hybrid energy storage system made up of battery power unit as well as an ultra capacitor pack is recognized as. A parallel electricity-linked multi input ripper tools having a half-bridge bidirectional Electricity/Electricity cell topology is selected to link battery Or ultra capacitor storage space uses the electricity-link. The paper concentrates on modeling the suggested ripper tools for dynamic and steady condition analysis. This paper presents modeling, design and analysis of the bidirectional half-bridge Electricity/Electricity ripper tools appropriate for power electronic interface between your primary energy storage system and also the electric traction drive in hybrid electric vehicles. Averaging and linearization techniques are applied to get the averaged condition space models and small signal types of the ripper tools both in boost and buck operation modes. A qualifying criterion for sizing the ripper tools passive components in line with the enforced design specifications and constraints is highlighted. Particularly, short-circuit problems and open-circuit problems of diodes and transistors are examined. Simulation outcomes of the buck-boost ripper tools during normal functioning and under faulty the weather is presented.**

Keywords: **Bidirectional DC/DC Converter; Hybrid Electric Vehicles; Components Sizing; Fault Analysis;**

I. INTRODUCTION

This paper presents modeling, design and research into the later ripper tools. A Hybrid Energy Storage System (HESS) made up of battery power unit as well as an Ultra Capacitor (UC) pack is recognized as. In line with the study done, a parallel electricity-linked multi-input ripper tools with half-bridge bidirectional Electricity/Electricity cells is selected to link battery Or UC storage space using the electricity-link. The Electricity/Electricity ripper tools can be used to supply a controlled electricity current at greater level towards the inverter and also to control power flow back and forth from the electrical drive during motoring and generating modes correspondingly [1]. The paper mainly concentrates on modeling the suggested ripper tools for dynamic and steady condition analysis. Using Electricity/Electricity converters is important in hybrid vehicles. The whole process of the buck-boost ripper tools is highlighted during normal functioning and under faulty conditions caused by power switching device problems. Particularly, Short-Circuit (SC) and Open-Circuit (OC) problems of diodes and transistors are examined. Just one fault is transported at any given time resulting in eight different fault operation modes.

II. PROPOSED METHOD

When making a bidirectional Electricity/Electricity ripper tools appropriate for Power Electronic Interface (PEI) between your Energy Storage System (ESS) and also the electric traction drive, you should indicate the specifications from the electric traction system. To be able to determine the electricity-link current and also the energy storage space capacity in the Electricity/Electricity ripper tools terminals, it's empirical to specify the automobile hybridization level. A complete HEV is selected with large traction motor, high-capacity energy storage pack and primary Electricity bus current. Unlike series hybrids, parallel hybrids require less quantity of energy conversion stages and have less power demands around the electrical system making parallel hybrids less costly and much more energy-efficient. A parallel hybrid drive train as opposed to a series the first is selected for many reasons. HEVs depend around the capacity of the ESS considerable amounts of one's but additionally to release demand. A higher power, high energy, and hi could be acquired through the use of a hybrid battery The UC will raise the ESS power handle reserve the quantity of regenerative energy friction brakes because of the low power handling battery. The UC can be used during transient pea and also to capture regenerative energy which g current variations and stresses over the bat release the responsibility of power ripper tools interface. The AC drive is really a classic Permanent Ma Motor (PMSM) drive featuring it’s a PM bridge current source inverter along with a controller. Current source inverters are co HEV applications, in which the source deliver PMSMs exhibit greater efficiency, greater p greater torque-to-inertia ratio when compact motors. These advantages along with the fast make PMSMs good

candidates to be used in disadvantage is using magnet only costly but additionally responsive to load and. To obtain full control of the ability flowing battery and also to limit the fluctuating current terminals, it's important to employ an Electricity/Electricity self storage units and also the AC drive [2]. The suggested multi-input bidirectional interfacing battery Or UC HESS and also the trace HEV includes two bidirectional half-bridge. Each half-bridge cell includes an element (inductor), two IGBT power trans diodes for bidirectional current flow. IGBTs they're appropriate for low frequency, high p like the full hybrid vehicle considered. A interfacing the origin functions like a filter restricting ripple and also the circulation of high-frequency with the sources [3]. This filtering is principally Equivalent Series Resistance (ESR) of every UC pack. Finally, one common output ca backward and forward cells to reduce the current bus and also the inverter input terminals as the voltages stay at an amount lower compared to t.

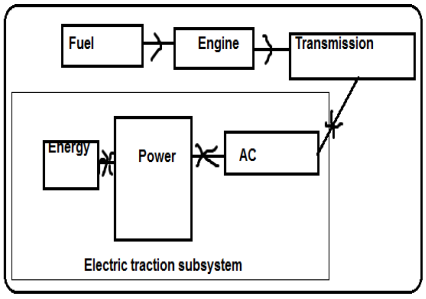

Fig.1.Proposed method

III. IMPLEMENTATION

Dynamic modeling of power ripper tools would be to study its transient behavior and evaluate ho input current, load current, and duty cycle current. However, a switching power nonlinear time-different system that is hard to its intrinsic large signal nature. Small sig generally used method of simplify the m Ss not just to store e based on load high quality ESS y/UC combination. ling capacity and dissipated within the ng capacity from the ak power demands greatly cuts down on the battery terminals and acing battery. Magnet Synchronous MSM, a 3-phase power electronic generally utilized in a stiff current. Power density and bared to induction st torque response HEVs. Electricity/Electricity ripper tools action drive within the e cells as proven within an energy storage transistors, and 2 s are selected since power applications A port capacitor the origin current frequency components y used because of the from the battery and capacitor is shared ge ripple in the Electricity he battery and UC the electricity-link. Necessary so as w variations within the e affect its output were ripper tools is really a cult to evaluate due signal modeling is really a analysis, control and style of the ripper tools nonlinear right into a straight line time-invariant system using the average worth of switching period and it is no modeling which helps an behavior. The ripper tools condition derive the little signal average transfer functions that are fu controllers to manage the machine the switching power ripper tools variables would be the capacitors volume current, iL. The input variables input source current, vin for bat may be the electricity-link current, vo, for U current, iin, for battery given ripper tools. The half-bridge ripper tools it's examined once like a boost disadvantage battery Or UC towards the load side walking lower current in the bridge ripper tools never operation mode because of the fact the p T2 with D1) function in com bidirectional load and source. in addition to stresses on pas Furthermore, the half-bridge disadvantage wise, and therefore when T1 is that if both transistors lead in the of destroying components. The ripper tools condition voltages, vCin and vCo, and inductor would be the load current, io, and also the ttery or UC [4]. The output variable UC given ripper tools and also the source inverter. This fact reduces current peaks passive and active components. Inverter switches function pair-ON, T2 is OFF, and the other way around. A mathematical type of the ripper tools during boost and buck operations could be acquired by making use of Kirchhoff's current and current equations for each one of the commutation modes. The parasitic resistances of power inductors and capacitors, the transistors ON resistances and also the storage space ESR are incorporated. The ripper tools averaged condition space equations are acquired if you take a linearly weighted average from the equations both in switching modes while using duty cycle as control variable. During steady condition, the averaged inductor current more than one switching period is zero this is whets called the key of inductor volt second balance. To get the small signal model equations in the condition space equations, the condition variables, output variables and duty cycle like a control variable is going to be split up into their steady condition average Electricity values symbolized by upper situation variables along with a small AC variation concerning the average values. To fulfill the electrical traction power need for a complete HEV, the ripper tools is with a rating of 30kW output power. Current, current and power ratings derive from the needs of the HEV with 300V-30kW electricity-link. Practical switching frequencies for power switching converters utilized in HEVs fall in the plethora of 15-20kHz. A source of energy of 200V is recognized as in the input from the Electricity/Electricity ripper tools. To ensure the ripper tools operation, the suggested design is simulated using Mat lab/Simulink in line with the parameters specified [5]. The whole process of the buck boost ripper tools is highlighted during normal functioning and under faulty conditions

caused by power switching device problems. SC and OC problems from the ripper tools diodes and transistors are examined.

IV. CONCLUSION

This paper presents modeling, design and analysis of the half bridge bidirectional Electricity/Electricity ripper tools like a PEI from a HESS and also the primary Electricity bus in HEVs. The ripper tools components are sized in line with the design needs of the full HEV. To ensure the ripper tools operation, the suggested design is simulated using Mat lab/Simulink. Summarizes the ripper tools simulation results under normal and faulty conditions for boost and buck operations. The result of power switching device problems caused by SC and OC diodes and transistors is examined. In conclusion, fault modes 1, 2, 3, 5, 6, and seven can harm the power ripper tools whereas, OC transistor problems don't damage the ability ripper tools. When T2 is OC, the power storage space is straight to the electricity-link the PEI continues operation although not like a boost ripper tools. When T1 is OC, the power storage space is totally disconnected in the electricity-link the ripper tools behaves as if it's shut lower. However, OC diode problems, lead to high current spikes over the ripper tools power switching components that could damage the ability device. Whereas, SC diodes and transistors produce large bursts of current flowing with the ripper tools components. To conclude, the parameters measured for control purposes, like the ripper tools output current/current and also the inductor current and current, can be used key parameters in discovering and identifying the fault mode where techniques for example residual redundancy and greater-order moments are suggested with such an example problems.

V. REFERENCES

[1] A. Di Napoli, F. Crescimbini, S. Rodo, and L. Solero, “Multiple input DC-DC power converter for fuel-cell powered hybrid vehicles”, in Proc. IEEE PESC 2002, vol. 4, pp. 1685-1690.

[2] L. Solero, A. Lidozzi, and J.A. Pomilio, “Design of multiple-input power converter for hybrid vehicles”, IEEE Trans. on Power Electronics, vol. 20, no. 5, pp. 1007-1016, Sept. 2005.

[3] P.B. Bobba and K.R. Rajagopal, “Modeling and analysis of hybrid energy storage systems used in Electric vehicles”, in Proc. IEEE PEDES 2012, pp. 1-6.

[4] A. Di Napoli, F. Crescimbini, F. G. Capponi, and L. Solero, “Control strategy for multiple input DC-DC power converters devoted to hybrid vehicle propulsion systems”, in Proc. IEEE ISIE 2002, vol. 3, pp. 1036-1041.

[5] A.J. Forsyth and S.V. Mollov, “Modelling and control of DC-DC converters”, Power Engineering Journal, vol. 12, no. 5, pp. 229-236, Oct. 1998.

AUTHOR’s PROFILE

B. HARI KRISHNA completed his B.Tech in Narayana Engineering College, Gudur in 2012. Now pursuing Mtech in Power Electronics & Electrical Drives Engineering in Priyadarshini Institute Of Technology, Nellore.

Mr.M.SANKAR BABU is an Assistant Professor in EEE dept at Priyadarshini Institute of Technology Nellore. He obtained his B.Tech Degree in EEE from ASCET, JNTUA, Gudur in 2009, M.Tech degree in Electrical Power Engineering from NEC JNTUA,Nellore in 2012.He has 7 years of teaching experience and his area of interest is Control Systems, Power Systems, Power System Operation & Control and he has published 2 papers in referred international journals and attended 5 national workshops.

