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REVIEW ON HIGH-EFFICIENCY, HIGH LIFETIME AND LOW- COST BATTERY ELECTRICAL VEHICLE WITH UNITY POWER FACTOR CHARGER

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ABSTRACT- The Transportation plays important role for the developing country, for that there should be energy sources present. Generally nonrenewable energy sources decide the economies of any nation day by day these sources are reduced and demand increases so that The battery electrical vehicle is the intriguing issue for the present advancement In this paper we have recommended the different procedures and strategies to work the battery electrical vehicle at high proficiency in this the yield gave to the engine ought to be liberated from music that can be controlled utilizing power gadgets hardware. In standard converters it was see that half of force misfortune during the conversion[5] so we supplanted that influence hardware components with high productive influence gadgets likewise we have recommended the different materials which lessens the expense of battery electrical vehicle additionally we have focused on the battery life so that the life time of the battery electrical vehicle increases it can be seen in previous chargers there would be operated at lagging power factor because of exchange of the reactive power from converter circuit supply side here we use the cuk converter to operate the converter of the battery electric vehicle at unity power factor with the proper isolation also fast charging can be done.

Index Term – Cuk Converter, EV Battery , Rectifier, Regenerative Breaking

I. INTRODUCTION

The energy source of vehicles is changing rapidly and significantly in recent years with the increase in renewable energy technologies especially in the case of electric vehicles (EVs). A smart solution has emerged in which the wasted energy in a vehicle's shock absorber is converted to an alternative energy for the cars themselves, and this is called an energy regenerative shock absorber. Whereas existing regenerative shock absorbers mainly focus on the methods of energy harvesting, there is no such regenerative shock absorber for use in extended range EVs. In this paper, we present a novel high-efficiency energy regenerative shock absorber using super capacitors that is applied to extend the battery endurance of an EV. Many single stage AC-DC topologies for power factor improvement have been described by Singh et al in. The boost converter is the most widely used topology for PFC applications but to make the unity power factor operation available for wide range of input voltage, buck-boost converter present more attractive solution. Design and analysis of different buck-boost converters for variation in dc bus voltage and input voltages. Some non-inverting buck-boost converters which are suitable

Li-ion batteries have supplanted the ordinary batteries like soluble, Ni–Cd, and lead corrosive batteries in a wide scope of uses, going from microelectronics to aviation. The prime justification this compass is up to multiple times higher voltage of Li-particle battery (∼3.6 V) contrasted with fluid batteries (∼1.2–2 V) and up to multiple times higher gravimetric explicit energy of Li-particle battery (∼240 Wh/kg) contrasted with lead corrosive battery (∼40 Wh/kg).After many years of serious exploration on every segment of Li-particle batteries, they would now be able to be named as quite possibly the most generally utilized battery-powered frameworks. Li-particle batteries are likewise imminent contender for use in electric vehicles. Notwithstanding, the very realities that give Li-particle batteries an edge over the antacid and Ni–Cd batteries are additionally the bottlenecks of this innovation. Wide voltage window requests the utilization of non-watery electrolytes. Be that as it may, the realized no watery solvents are thermodynamically instable in this voltage window. The cutting edge Li-particle battery is additionally called the "armchair" battery. It includes inclusion materials as dynamic materials. The Li-particles transport to and fro between the negative and positive anodes during cycling. The electro science of a normal Li-particle battery is displayed in Fig. 1. By a wide margin, the most well-known dynamic material utilized in the negative terminals is graphite (C6 + xLi+ + xe−_C6Lix). Notwithstanding, there are innumerous other kinds of carbons which have also been used. As positive electrode mostly transition metal oxides and phosphates have been employed, out of which LiCoO2, LiMn2O4, andLiFePO4 are the most common ones. During first charge of the Li-ion battery the electrolyte undergoes reduction at the negatively polarized graphite surface. This forms a passive layer comprising of inorganic and organic electrolyte decomposition products. In an ideal case this layer prevents further electrolyte degradation by blocking the electron transport through it while concomitantly allowing Li-ions to pass through during cycling. This essential passive layer has appropriately been named solid electrolyte inter phase (SEI) . The onset potential of SEI formation is not a fixed value. Literature offers values such as 2V, 1.7V, or 1V , but 0.8Vis the most widely adopted practical value. SEI formation may also continue up to few cycles. However, this parameter cannot be normalized because it depends on a number of factors like nature and composition of electrolyte, nature of additives used in the electrolyte, and sweep rates , etc. It is

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II. DESIGN AND OPERATION

Proposed Isolated UPF Cuk Converter The general schematic of the proposed PFC Cuk converter based battery charger has been appeared in Fig.2, with DC interface kept steady at 65 V at the converter's DC end,. This figure demonstrates the charger schematic comprising a DBR, a PFC disconnected converter and the CC-CV control for battery accusing procedure of fell PI controller (double circle). The unregulated dc voltage from the yield of a diode connect rectifier is utilized as power hotspot for the proposed secluded PFC converter. The proposed UPF converter comprises of a high recurrence switch Sw, an information inductor Li, a yield inductor Lo, two middle of the road capacitors C1, C2 and a high recurrence disconnection transformer (HFT).

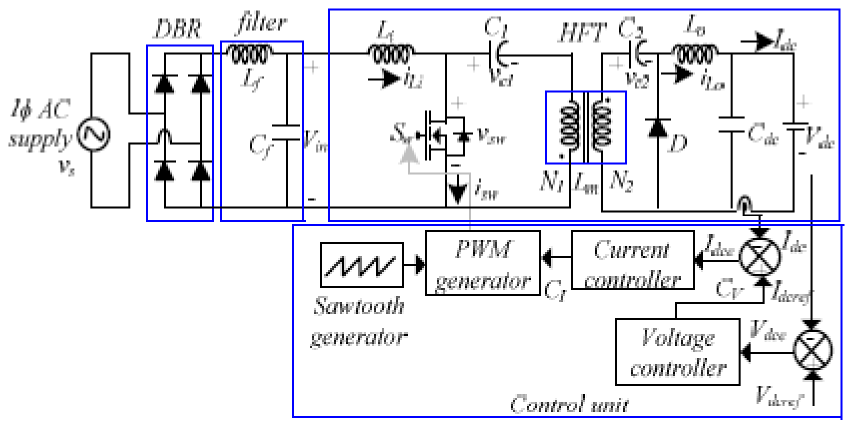

Fig 1: General Schematic of an EV Battery Charger with PFC CUK Converter

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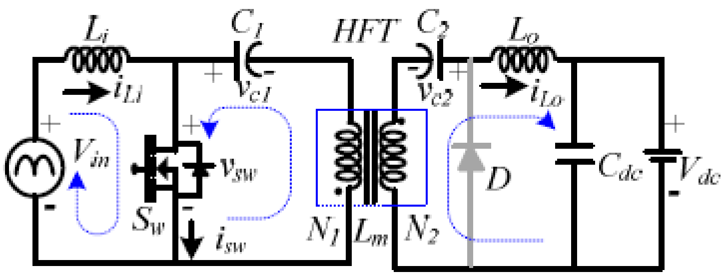
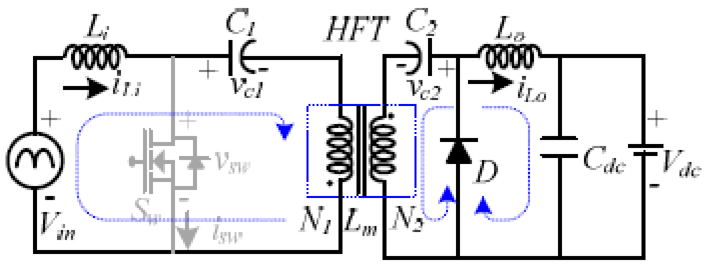
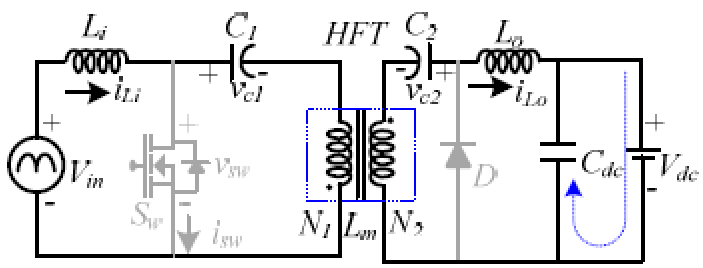


(a)



(b)



(c)

The vitality exchange from contribution to yield side happens by means of the middle of the road capacitor C1, C2. The information inductor Li charges through the high recurrence switch Sw when it is in ON condition and discharges its vitality through the capacitor C1.This, thus charges the polarizing inductor of the HFT. When, polarizing inductor charges, the capacitor C2 at the auxiliary side of the HFT begins releasing through the yield inductor and exchanges the expected vitality to the heap. At the point when turn Sw is killed, the diode at the optional side of the HFT ends up forward one-sided and yield inductor finds the releasing way through the dc connection and diode D at the yield, the battery is persistently getting charged from that point steady dc interface voltage kept up over the yield terminals of the proposed charger.

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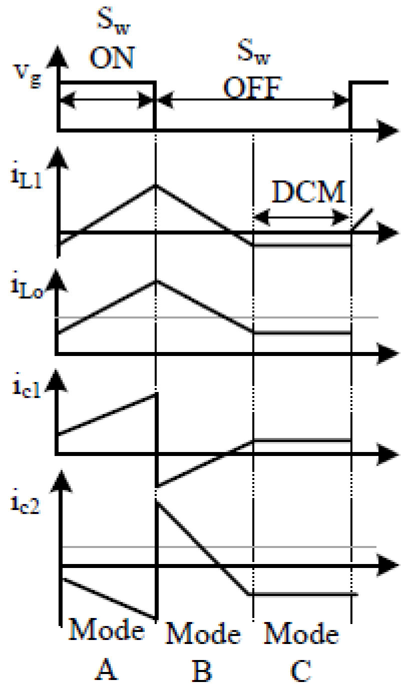

Fig2. Operation of the proposed Cuk converter with isolation and power factor Correction in (a) mode A (b) mode B (c) mode C (d) Switching currents Through the different components in circuit

A double PI based shut circle control is utilized at the battery yield terminals to enhance the power quality at the information side of the charger. To control the charge streaming into the battery, the battery voltage, similarly as current, is distinguished and stood out from the best reference regards. The misstep signals are then gone through the PI regulators to deliver the crucial changing gathering to the high repeat switch. The battery is charged in reliable current mode from the start then after a particular breaking point the control changes to the consistent voltage mode control. The swell current in the battery is lessened for the proposed UPF circuit. Particular working (Modes A-C) are being addressed by Figs.3 (a)- (c). These figures are depicting unquestionably the steady and DCM of action for various segment utilized in the PFC converter dependent on the conduct of these segments, the current drawn from information is accomplished ideal sinusoidal fit as a fiddle enhancing the info PF to solidarity. In any case, different Operating stages for the proposed Converter are characterized as: Mode A (Fig.2):

Mode A begins with the ON state of the semiconductor switch S1 amid which input inductor L1 begins charging through the way appeared in Fig. 2. The current in the inductor L1 increments with the mains voltage which chooses the slant of the inductor current for the specific moment.

2.1. Components of SEI

The creation of the SEI is a profoundly discussed subject. It is very reliant on various components, which are nitty gritty in Section3. Proposed organization of SEI fluctuates starting with one research bunch then onto the next as working conditions in various labs can be unique. In this way it is difficult to standardize or sum up the synthesis or even substance of SEI. Table 1 records what different research bunches accept to be the significant segments of the SEI. Countless salts (hastens) starting from salt decreases might be available in the SEI. Subsequently, all the conceivable (revealed) inorganic segments are not recorded in Table 1. We list the most conceivable and regular SEI segments alongside their references to the best of our insight.

2.2. Changes in SEI at elevated temperatures

The SEI structure and thickness does not remain steady all through cycling or capacity. There are various ways in which it can change. It might incompletely break up in a dissolvable of the electrolyte, e.g., dim ethyl carbonates (DMC) . Its thickness may likewise differ amid cycling. SEI is accepted to be thicker at lower possibilities (contested condition of carbon) and more slender at higher possibilities (delithiated state). Anyway the progressions showing up in the SEI are increasingly articulated at lifted temperatures. There are two prime responses that happen on hoisting battery temperature. First change of SEI happens. Here, the segments like lithium alkyl carbonates and semi carbonates convert to the steady segments like Li2CO3. Be that as it may, the temperature at which this happens is exceptionally reliant on the salt and dissolvable of the electrolyte, kind of carbon material, and its particular surface territory. For 1MLiPF6 in ethylene carbonate (EC) and diethyl carbonate (DEC) the beginning temperature was observed to be 105 ◦C.n Whereas for LiBF4containingelectrolytes it was as low as 60 ◦C. The second procedure happening at high temperature is the response of dynamic material with the SEI, or SEI with the electrolyte, or dynamic material with the electrolyte. This starts at 120–140 ◦C . At this temperature, the changed SEI enables Li from carbon to come into contact with the electrolyte and electrons to go through the SEI. Past this temperature, significantly increasingly exothermic responses like that of prosecuted carbon with fasteners (for example polyvinyli denedi fluoride hexafluoro propylene (PVDF-HFP) at 350 ◦C) happen. All these exothermic procedures are adverse for the execution of a Li-particle battery and are basic from the

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wellbeing perspective. In this way they are cautiously analyzed by thermo investigative system, for example, differential examining calorimetric and quickened rate calorimetric.

2.3. Impact of SEI on battery execution

Each parameter and property of the SEI altogether influences battery execution. The piece, thickness, morphology, and Compactness are a couple to name. Irreversible charge "misfortune" (ICL) in the primary cycle happens because of dissolvable decrease and SEI arrangement and is thus a normal for SEI . Inconvenient procedures happening amid capacity (self-release) additionally rely upon the capacity of the SEI to lack of involvement dynamic material surface. Thus, timeframe of realistic usability of a battery additionally relies upon SEI . As referenced above SEI may likewise break up and additionally develop amid cycling. Accordingly, powerful and stable SEI is compulsory for good cycling life of the battery . It turns out to be considerably increasingly vital amid cycling at high rates and at deeper depth of release. SEI parts are very temperature touchy. Consequently, execution of the battery at high/low temperature is reliant on the SEI . Anyway the most vital result of SEI is on the security of the battery.

III. BREAKING SYSTEM

3.1 Improvement of Regenerative Energy for an EV

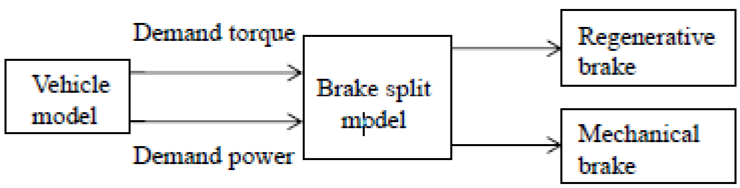

Fig4: Brake model

The brake display is appeared in Figure 3. The brake compel is separated into the mechanical brake and the regenerative brake by the brake split model. The mechanical brake constrain is characterized as an esteem subtracts the regenerative brake compel from the interest brake direction.

3.2 A proposed strategy to build the measure of the regenerative vitality

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The regenerative brake of EVs, HEVs is restricted in view of the engine limit and the present furthest reaches of the battery as depicted above area. Thus the regenerative electric brake as well as the mechanical brake must be utilized. To expand the regenerative vitality, the engine limit and the battery limit are asked for to be substantial; anyway it is extremely troublesome as a result of the expense and the limit of the inverter limit. Along these lines, in this paper, the regenerative vitality is expanded by enhancing a breaking technique without changing the power train framework.

3.3 Averaging the deceleration technique

For instance JC08 mode which is utilized for the fuel utilization estimation in Japan is utilized as appeared in Figure 7. The proposed technique is averaging the deceleration when the vehicle is decelerated. Figure 8 demonstrates a correlation of the deceleration between the JC08 display and the proposed model. The deceleration of the proposed model is littler than the JC08 demonstrated by averaging the deceleration. Figure 9, 10 and 11 demonstrate the correlation aftereffects of the vehicle speed, the deceleration and the interest brake control, individually. Figure 10 demonstrates the deceleration of the proposed model is half of the most extreme estimation of the first model by averaging the deceleration. Thus the deceleration as well as the maximum interest control is decreased 66% esteem. Subsequently the regenerative vitality of the proposed model is bigger than the JC08 display notwithstanding when the regenerative brake is constrained by the info current limit of the battery. Averaging the deceleration strategy can be accomplished by utilizing a driving help device, for instance, the deceleration flag is appeared on a showcase with the route which gives the exhortation to the driver on the ideal vehicle task, or controlling a brake pedal by applying a stopping mechanism like a functionin

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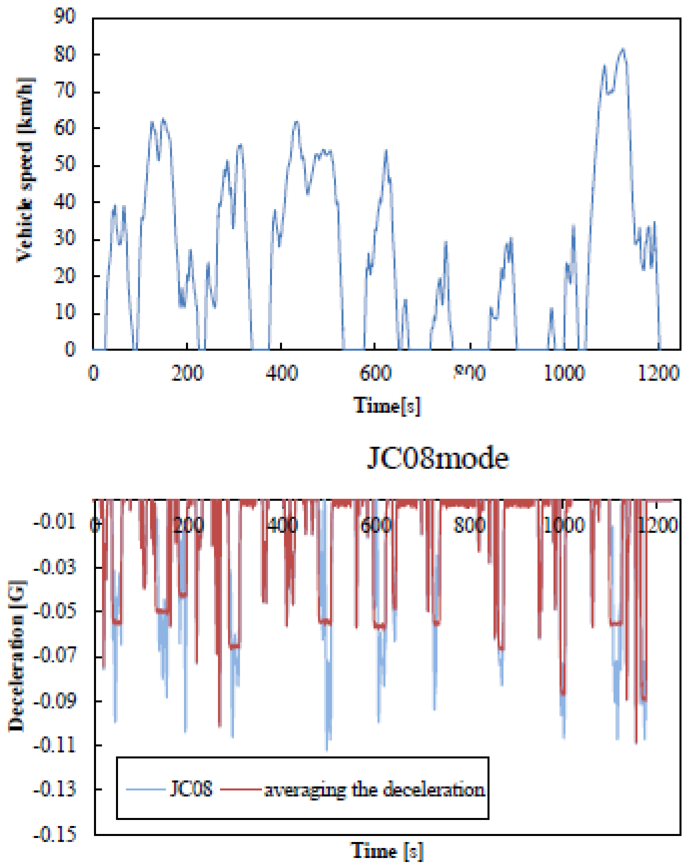

Fig5: Deceleration.

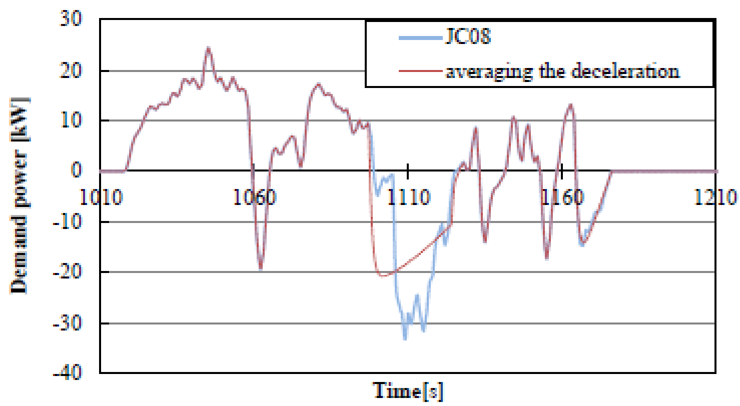

Figure 6: The comparison of the demand brake power

IV CONCLUTION

A decent SEI on negative terminal is an essential for good execution of a Li-particle battery. Examining, breaking down, and understanding the SEI have underlined the noteworthiness of the numerous viewpoints identified with it. It is clear that there are numerous related and connected elements affecting the SEI and numerous associated and corresponded results of SEI on battery execution. the inspiration driving why the regenerative imperativeness is obliged is first thing showed up, and a make progress strategy to ingest the regenerative essentialness is proposed. The proposed system is recognized by the driving undertaking, the regenerative imperativeness is enormously extended, for example it is amazing to acclimate to individuals overall vehicle considering the way that a vehicle way empowers the best deceleration to hold the regenerative essentialness. A detached Cuk converter based battery charger for EV with astoundingly improved PQ records close by very much directed battery charging voltage and current has been planned and reproduced. The converter execution has been discovered acceptable and well inside standard for evaluated just as various differing input rms estimation of supply voltages. The impressively enhanced THD in the current at the source end makes the proposed framework an appealing answer for proficient charging of EVs requiring little to no effort.

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