Battery pack voltage equalization processing principle

What is the goal of battery equalization?
The goal of equalization is to increase the battery pack's consistency as well as the battery pack's real capacity. The higher the equalization efficiency,the shorter the battery equalization time. The balancing goal can be formulated as: where represents the SOC of the ith battery,the battery pack has 2 n batteries in total,.

How to equalize a parallel battery pack?
Studies on the equalization of parallel battery pack have also been conducted ,,. The literatures ,achieve parallel equalization by adding a DC/DC converterfor each parallel module,which is not conducive to the size and cost reduction of the equalization system .

What is layered battery equalization method?
A layered battery equalization method is proposed,which reduces the calculation difficulty of the equalization currentby layered equalization of the batteries in the group and calculates the equalization current in real-time according to the state of the batteries in the group.

What is equalization time in a battery pack?
Equalization is defined as the least square sum of the battery pack's SOC and its average SOC being less than 0.01,and the equalization time is defined as the time from start to end of equalization. The specific simulation parameters are shown in Table 3 and Table 4. Figure 3. External current for the battery pack. Table 3.

Is there an active equalization method for series-parallel battery pack?
Based on the above analysis, this paper proposes an active equalization method for series-parallel battery pack based on an inductor. The main contributions are described below. The energy storage device responsible for energy transfer requires only one inductor and the topology is simple and low cost.

Why do we use battery pack capacity as the equalization objective?
The concept of using battery pack capacity as the equalization objective is that all cells are theoretically fully charged or discharged at the same time. Thereby it can avoid reaching cell cut-off voltages and make the battery stop charging or discharging even when the capacity or SOC is not zero ,thus maximizing capacity utilization.

Equalization circuits for series battery packs are mainly divided into passive equalization and active equalization . Passive equalization is mainly the parallel resistance ...

Aiming at the energy inconsistency of each battery during the use of lithium-ion batteries (LIBs), a bidirectional active equalization topology of lithium battery packs based on ...

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Battery equalization helps to prevent overcharging by making sure that all of the cells in your battery pack are charged to the same voltage. Equalization also helps to extend the life of your batteries by ensuring that they are not subjected to prolonged periods of high stress (from being overcharged or discharged too deeply). If you have a lead acid battery, it is ...

Research Article Bidirectional Active Equalization Control of Lithium Battery Pack Based on Energy Transfer Minghui Ma,1 Zhoufeng Liu,2 Jiangtao Xi,3 Jiyue Wang,1 and Tao Yu1 1School of Vehicle and Traffic Engineering, Zhengzhou University of Science and Technology, Zhengzhou, Henan 450064, China 2Henan Province Multi-mode Image Processing and ...

Additionally, this circuit has reduced the equalization time (for two 4200 mAh, 3.7 V Li-ion cells, it takes 76 min, 207 min for four 12 V, 1.5 Ah lead acid batteries and 4.64 min for 100 F SC), high efficiency (96% for Li-ion battery, 94.2 for lead-acid battery and 83.6 for SC respectively), zero voltage gap, minimum cost, and miniature size. This is because the number ...

An improved buck-boost circuit equalization method for series connected battery packs. IEEE 4th International Electrical and Energy Conference (CIEEC), pp. 1-6. Wuhan, China, IEEE. [Google Scholar] 21. ...

Aiming at the energy inconsistency of each battery during the use of lithium-ion batteries (LIBs), a bidirectional active equalization topology of lithium battery packs based on energy transfer was constructed, and a bivariate equalization control strategy of adjacent SOC difference and voltage is proposed according to the corresponding ...

Lithium-ion battery voltage equalization is of great importance to maximize the capacity of the whole battery pack and keep cells away from over-charge or over-discharge damage this ...

To overcome this problem, an active equalization method based on an inductor is proposed for the series-parallel battery pack. The energy storage device responsible for ...

Effective balanced management of battery packs can not only increase the available capacity of a battery pack but reduce attenuation and capacity loss caused by cell inconsistencies and remove safety hazards caused by abnormal use such as overcharge and over-discharge. This research considers both the equilibration period and the battery ...

Data-driven equalization strategies use the voltage, SOC, and capacity estimated by the EMS or BMS to sort, compare, find the variance of equalization variables, and other operations to obtain eigenvalues to judge the degree of battery pack imbalance and realize equalization. This method is simple, easy to implement, and widely used. In this ...

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(a) Equalization Variables: Battery management system (BMS) plays an essential role in the state monitoring and operation control of battery packs [13], [14].The performance of the cell after equalization is determined by the choice of equalization variables. The equalization variables can be categorized into voltage-based [15], [16] and state-of ...

According to the principle of optimal control of energy transfer efficiency, the point-to-point transmission of energy from high voltage battery to low voltage battery greatly shortens the energy transmission path, reduces the volume of the system, and also increases the scalability of the circuit. Therefore, the new equalisation method proposed in this paper plays ...

When the highest and lowest voltage cells are in the same series battery pack P x, assuming that B xi has the highest voltage and B xj has the lowest voltage, the equalization principle is shown in Fig. 2. The equalization process of ...

Equalization circuits for series battery packs are mainly divided into passive equalization and active equalization . Passive equalization is mainly the parallel resistance between the two ends of every single cell in a battery pack, which reduces the voltage difference between the cells through the power loss of the high-voltage single cell on ...

Active equalization transfers energy using an energy storage element, reducing battery pack inconsistency . The active equalization circuit mainly includes four structures: inductor, capacitor, transformer and converter. ...

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