Lithium battery topology circuit

Can reconfigurable topology solve battery balancing problems?
To solve these problems, in this study, we adopted a new battery balancing topology called reconfigurable topology, which can isolate the lowest SOC (state of charge) battery cell or the faulty battery cell without affecting the normal operation of other cells in the pack.

What is a battery topology & how does it work?
In this topology, energy is exchanged between modules through a boost circuit, and battery energy inside the module is exchanged using multiple multifaceted transformers. The design offers the advantages of high equalization accuracy and the ability to adjust equalization currents as required.

Does a designed topology solve a series-connected battery pack inconsistency?
The experimental results demonstrate that the designed topology has better equalization performance under different initial SOC distributions and switching frequencies. It verifies that the equilibrium model is able to effectively solvethe inconsistency of the series-connected battery packs. 1. Introduction

Why are lithium-ion batteries connected in series and parallel?
Lithium-ion batteries are usually connected in series and parallel to meet the voltage and power requirements of loads because of the low voltage and capacity of one single battery [4]. The origination of inconsistency of lithium-ion batteries can usually be separated into the production process and the usage process [5].

What is a lithium battery equalization circuit?
Lithium batteries are widely applied in new energy vehicles and related energy storage industries due to their superior performance. The application of an equalization circuit can effectively reduce the inconsistency of the energy of the battery pack, thereby extending the service life of the battery pack.

How to quantify the equalization effect of series-connected lithium-ion battery groups?
To better quantify the equalization effect,the battery difference and energy utilization rateare defined for evaluation. In order to address the inconsistency problem of series-connected lithium-ion battery groups in practice,a two-level balanced topology based on bidirectional Sepic-Zeta circuit is designed in this article.

In this paper, eight lithium-ion batteries are selected as experimental objects, and the initial SOC values of the eight lithium-ion batteries are shown in Table 2, the initial mean SOC value of the lithium-ion battery pack was 67.5%, the rated voltage of a single lithium-ion battery is 3.7 V, the upper cutoff voltage is 4.2 V, the rated capacity is 5400 mAh, and the ...

A high-efficiency active cell-to-cell balancing circuit for Lithium-Ion battery modules is proposed in this paper. By transferring the charge directly from the highest voltage cell to the lowest ...

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In this study, an innovative two-layer equalization circuit design is proposed, which is based on a Buck-Boost circuit and a switched-capacitor circuit, and successfully realizes one-to-one and many-to-one equalization within a series-connected energy storage lithium-ion battery pack. The Buck-Boost converter is combined with a bus-based strategy to form a bus-based Buck-Boost ...

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The battery cell equalisation techniques have been an object of research in numerous studies in recent years [1][2][3][4][5][6]. The review of the primary equalisation circuits in [1] presents and ...

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Internal short circuit is one of the unsolved safety problems that may trigger the thermal runaway of lithium-ion batteries. This paper aims to detect the internal short circuit that occurs in battery pack with parallel-series hybrid connections based on the symmetrical loop circuit topology.The theory of the symmetrical loop circuit topology answers the question that: ...

Due to their long lifespan and high energy density, lithium-ion batteries are now the preferred source of power for electric vehicles. However, due to various factors in ...

A novel non-dissipative two-stage equalization circuit topology based on the traditional Buck-Boost circuit is proposed to achieve balancing of series-connected lithium-ion battery packs with ...

Lithium-ion batteries are widely used because of high power, energy density, long life and low environmental pollution [4], [5]. However, the small voltage of a single cell is not enough to meet the needs of electrical equipment. ... The intergroup equalization adopted the SS topology with a buck circuit, which connects the battery packs for ...

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 ...

A novel, active cell balancing circuit and charging strategy in lithium battery pack is proposed in this paper. The active cell balancing circuit mainly consists of a battery ...

Many lithium-ion battery cells are usually connected in series to meet the voltage requirements. The voltages of the entire series-connected battery cells in a battery pack should be equal. ... A suitable logic control is essential for this equalizer, especially to avoid short circuit among battery cells. ... This topology also helps to reduce ...

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The chemical structure of lithium-ion (LIB) batteries is particularly vulnerable to overcharging and deep discharge, which may damage the battery, reduce its life, and even cause dangerous things.

Aiming at the inconsistency problem of series-connected lithium-ion battery packs in use, this article proposes a two-level balanced topology based on bidirectional Sepic ...

The series of energy storage devices, namely battery, super/ultra-capacitor string voltage balancing circuit, based on a single LC energy converter, is presented in this paper transfers the excess energy directly from the higher cell to the lower cell in the string. This requires n-4 bidirectional MOSFET switches and a single LC tank for n number of energy ...

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