Battery Pack Thermal Inconsistency

The inconsistency reduces battery pack lifetimes and increases their usage costs. Active balancing is an effective technique for performance equalization between cells. Here, a quantitative analysis method based on an active balancing circuit is developed to explain how battery capacity inconsistency is affected by balancing parameters.

At present, battery pack inconsistency diagnosis, based on artificial intelligence, mainly uses the fuzzy-logic diagnostic method. ... As mentioned above, the greater the temperature difference among cells is, the shorter the cycle life of a battery pack is. Thermal management plays a critical role in ensuring battery life and safety. It needs ...

In this paper, the multiple parameters of battery packs are obtained through systematic testing, contributing to achieving the accurate simulation of electrical and thermal ...

Many traditional fault diagnosis methodologies have been developed for battery diagnosis schemes; such as thermal fault diagnosis, capacity droop and SoC estimation, etc. Sidhu et al. [13] proposed the Extended Kalman filter (EKF) method to generate the voltage residual signals, and evaluated the fault occurrence by residual signals.

SOC inconsistency may cause battery electrical abuse. In this manuscript, a battery testing system, scanning electron microscope, heat furnace, and so on were employed to investigate the influence of SOC inconsistency on electrical performance and thermal runaway (TR) characteristics in 2 serials 1 parallel (2S1P) LIB pack after cycling.

The focus of this article is on discussing the evaluation of battery pack inconsistency at multiple time scales and data-driven SOH prediction. It also analyzes the relationship between the coefficient of variation of inconsistency characteristics and the battery"s SOH. ... Studies on thermal management of Lithium-ion battery pack using water ...

Abstract: The performance inconsistency of lithium-ion battery packs is one of the key factors that lead to their accelerated lifespan degradation and reduced reliability. Hence, it is of great ...

To prevent battery thermal runaway for electric vehicles (EVs), it is necessary to figure out and apply the connections between temperature consistency in battery pack (TCBP) ...

Inconsistent electrical connections in a battery pack will cause a battery to have inconsistent working conditions, which are manifested in both electrical and thermal aspects [7, 8].Gong et al. [9] studied a large-capacity battery parallel module.The results showed that the uneven distribution of working current affected the subsequent aging process.

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An algorithm for a multi-objective optimization design of a lithium-ion battery pack was proposed by Palma-Behnke et al. based on the multi-physics coupling simulation method [38]. Thus, the method of multi-physics simulation is definitely an accurate scientific method for the thermal analysis of a battery pack.

Maintaining the battery pack"s temperature in the desired range is crucial for fulfilling the thermal management requirements of a battery pack during fast charging. Furthermore, the temperature difference, temperature gradient, aging loss and energy consumption of the battery pack should be balanced to optimize its performance. This paper establishes the liquid cooling thermal ...

However, the inconsistencies within the battery pack will deteriorate over the lifecycle and affect the performance of electric vehicles. Therefore, various thermal management systems and equalization systems have been applied in ...

Ganesan et al. developed an electrochemical-thermal coupled model for a battery pack to analyze the battery pack performance under various rates and temperatures. ... existing problems and future trends in the field of battery pack inconsistency research are elucidated. The effect of cell-to-cell variations and thermal gradients on the ...

To alleviate the temperature inconsistency within the battery pack, air-based battery thermal management systems (BTMS) are frequently utilized. ... A more realistic thermal model of the battery ...

Inconsistency is common in lithium-ion battery packs and it results in voltage differences. Data from a battery pack with 200 cells connected in serial in a battery energy storage system (BESS ...

Therefore, Zhao et al. [28] integrated battery inconsistency and pack performance indicators to assess the health condition based on evidential reasoning and belief rule base. Besides, Zhou et al. ... Improving battery thermal behavior and consistency by optimizing structure and working parameter. Appl. Therm. Eng., 196 (2021), Article 117281.

The performance inconsistency of lithium-ion battery packs is one of the key factors that lead to their accelerated lifespan degradation and reduced reliability. Hence, it is of great significance to accurately detect the consistency of cell parameters within the pack without destructive testing. The working current of the cell is the most direct and effective parameter to characterize the ...

The battery pack inconsistency directly affects output energy, which is an important factor reflecting the driving range of electric vehicles. Therefore, this manuscript focuses on influence degree analysis of inconsistency on output energy. Firstly, a novel battery pack inconsistency model, consisting of Gaussian mixture model (GMM) which well ...

Inconsistency is a key factor triggering safety problems in battery packs. The inconsistency evaluation of retired batteries is of great significance to ensure the safe and stable operation of batteries during subsequent

gradual use. This paper summaries the commonly used diagnostic methods for battery inconsistency assessment. The local outlier factor (LOF) ...

M. Naguib et. al: Li-Ion Battery Pack SOC Estimation, Cell Inconsistency, and Balancing Review 2 VOLUME XX, 2017 Date of publication xxxx 00, 0000, date of current version xxxx 00, 0000.

Modeling and control strategy optimization of battery pack thermal management system considering aging and temperature inconsistency for fast charging. Maintaining the battery ...

Therefore, voltage inconsistency can be used for battery fault diagnosis and prognosis in a full life span (Huang et al., 2020; Lu et al., 2020; Wu et al., 2021). Battery consistency also strongly influences the performance of the battery pack (Zhang, C.P. et ...

The calculated M 3 value for Vehicle Accident 1 is 1.06, suggesting that battery inconsistency is within a normal range. However, for the battery pack in Vehicle Accident 2, depicted in Fig. 13 (b), the dispersion of RMSEs of cells" voltage significantly worsens in the later period compared to the early and medium periods. The M3 value for ...

In this study, we show that thermal gradients are a key driver for whether a battery pack operates in a convergent or divergent mode, with the often overlooked cathode ...

The outcomes showed that the technique successfully alleviated the battery pack"s thermal imbalance issue, and provided a novel route for the improvement and optimization of the BTMS. Graphical abstract. ... Peng"s strategy cannot effectively solve the heat dissipation problem caused by battery cells" inconsistent thermal performance. Liu et ...

The battery pack is severe inconsistency when the standard deviation is more than 30%. It can be seen that the standard deviation of evaluation values is more than 30% after the four hundred cycles, which means the serious inconsistency. ... Comprehensive evaluation method of thermal power unit based on information entropy and principal ...

Cell-to-cell inconsistency analysis and structure optimization for a liquid-cooled cylindrical battery module. Jun Wang L. Ruan

An inadequately designed battery pack can engender disparate cooling effects on individual cells, resulting in significant temperature variations and heightened performance disparities, ultimately undermining the longevity and efficacy of the battery pack. 6 Therefore, it"s necessary to develop a battery thermal management system (BTMS) to ...

Peng et al. [73] considered the inconsistency of the cells in the pack and proposed a more realistic thermal model of the battery pack at a 1C discharge rate through equivalent calculation and ...

Request PDF | On Aug 1, 2024, Yixin Wei and others published Modeling and control strategy optimization of battery pack thermal management system considering aging and temperature inconsistency ...