Battery pack capacity detection method

The capacity inconsistency among commercial lithium-ion battery packs is an important factor affecting their service life. However, there is still a lack of detection methods to accurately test the capacity consistency of lithium-ion battery packs at cell level. To solve this problem, a non-destructive testing method for capacity consistency of lithium-ion battery pack based on 1-D ...

We here make the first attempt, to the best of our knowledge, to quantitatively detect ISC batteries under float charging conditions. By analyzing the balancing behavior of a ...

Indicators for evaluating battery consistency could be SOC, capacity, internal resistance, decay rate, coulomb efficiency and self-discharge rate (SDR) [[10], [11], [12]] SOC, capacity and internal resistance are state quantities, while decay rate, coulomb efficiency and SDR are time cumulants ncerning the cost and efficiency, conventional classification ...

A study on the fire behaviors of 18650 battery and batteries pack under discharge ... Cell capacity: 40 Ah; SOC: 100%; Voltage: 2.35 V; AC internal resistance: <=0 ... Research on Thermal Runaway Behavior and Early Fire Detection Method of Lithium Battery. In: Dong, X., Yang, Q., Ma, W. (eds) The proceedings of the 10th Frontier Academic Forum ...

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To solve this problem, a non-destructive testing method for capacity consistency of lithium-ion battery pack based on 1-D magnetic field scanning is proposed in this article. First, a magnetic field simulation model and measurement setup of lithium-ion battery are developed ...

The capacity inconsistency among commercial lithium-ion battery packs is an important factor affecting their service life. However, there is still a lack of detection methods to accurately test the capacity consistency of lithium-ion battery packs at cell level. To solve this problem, a non-destructive testing method for capacity consistency of lithium-ion battery pack ...

In this note, we describe a battery failure detection pipeline backed up by deep learning models. We first introduce a large-scale Electric vehicle (EV) battery dataset including cleaned battery-charging data from hundreds of vehicles. We then formulate battery failure detection as an outlier detection problem, and propose

The battery pack based on individual dual polarization battery models also verified that the method showed good effectiveness and efficiency in early identification of ISC cells.

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The proposed method is applied to the degradation data set of the battery pack to demonstrate its effectiveness. To prove the generalizability of our MMRNet model in the field of battery capacity degradation path prediction, four independent groups of degradation data sets of the cells were also selected to examine the applicability of the proposed MMRNet model.

This method calculates easily and is suitable for estimation in online situations [30]. Hence, the incremental SOC-capacity method is used to estimate charge-discharge capacity in this paper. ... Internal short circuit detection for battery pack using equivalent parameter and consistency method. Journal of Power Sources, Volume 294, 2015, pp ...

To comprehensively diagnose the ISC, we propose an ISC detection method to determine if an ISC occurs in the battery pack and an ISC resistance calculation method to evaluate the ISC fault severity. Indeed, we can notice from Fig. 13 that there is a significant change in the ISC current before and after the ISC occurs, implying that the ISC ...

Here, an in situ and nondestructive technology is proposed for this purpose, by imaging the magnetic field of the battery pack during its operation, the minor current imbalance within the ...

This paper proposes a soft short circuit (SC) fault detection method for a parallel battery pack. Since it is impractical to equip current sensors for all the cells in a parallel pack, a reconstructed state-space equation combining the electrical dynamic of a battery cell and the electrical characteristics of a parallel battery pack is designed ...

Internal short circuit (ISCr) detection of a battery is critical for preventing thermal runaway and enhancing electrical vehicle safety. In this paper, the electrical characteristics of the ISCr of a large format lithium ion battery are analyzed using the equivalent circuit model (ECM). An ISCr detection method is developed based on battery consistency ...

Lithium-ion batteries, with their high energy density, long cycle life, and non-polluting advantages, are widely used in energy storage stations. Connecting lithium batteries in series to form a battery pack can achieve the required capacity and voltage. However, as the batteries are used for extended periods, some individual cells in the battery pack may ...

A battery is grouped into many cells, and inconsistency is unavoidable in the battery life cycle. If the battery is frequently charged or discharged without a balancer, the battery cells with the lowest capacity may be overcharged or overdischarged, which is one of the major reasons for battery thermal runaway, which can cause a fire. This article proposes a cloud ...

Internal short circuit detection for battery pack using equivalent parameter and consistency method J. Power Sources, 294 (2015), pp. 272 - 283, 10.1016/j.jpowsour.2015.06.087 View in Scopus Google Scholar

Therefore, this paper presents a voltage fault detection method for lithium-ion battery pack using local outlier factor (LOF). The proposed method systematically incorporates a model-based system identification algorithm into an outlier detection algorithm. ... The initial capacity of the battery is set to 2.0 Ah. In other words, the initial ...

An online SOC and capacity estimation method for aged lithium-ion battery pack considering cell inconsistency

An Online Adaptive Internal Short Circuit Detection Method of Lithium-Ion Battery. January 2021; ... nese-cobalt battery with a nominal capacity of 2.2 A·h. ... The power battery pack is the ...

One of the main obstacles for the reliability and safety of a lithium-ion battery pack is the difficulty in guaranteeing its capacity consistency at harsh operating conditions, while the key solution is accurate detection of cell capacity inconsistency within the battery pack without taking it apart for destructive testing.

The timely and accurate detection of an internal short circuit (ISC) is critical for improving electric vehicle (EV) safety. Typical ISC detection approaches are based on consistency differences between each cell in a module. However, the indispensable equalizer in a battery management system reduces inconsistency, affecting the accuracy and timeliness of ...

Internal short circuit (ISC) is a critical cause for the dangerous thermal runaway of lithium-ion battery (LIB); thus, the accurate early-stage detection of the ISC failure is critical to improving the safety of electric vehicles. In this paper, a model-based and self-diagnostic method for online ISC detection of LIB is proposed using the measured load current and terminal ...

A pack-level detection method of abnormal lithium plating for LIBs is proposed. ... The rated capacity of the battery pack is 27 Ah. The specific cell and battery pack parameters are shown in Table 1. Table 1. Battery specifications. Item Parameter; Pack: Rated voltage/capacity:

A slightly simpler scenario extension is to add abnormal vehicles to the training set, which becomes a classification task, or anomaly detection methods such as one class SVM can be used to achieve better detection results. In the battery capacity detection task, we choose simple supervised learning, that is, only using charging snippets ...

Internal short circuit detection for battery pack using equivalent parameter and consistency method. ... Online quantitative diagnosis of internal short circuit for lithium-ion batteries using incremental capacity method. Energy, 243 (2022), Article 123082, 10.1016/j.energy.2021.123082. View PDF View article View in Scopus Google Scholar [16]

Typical ISC detection approaches are based on consistency differences between each cell in a module. However, the indispensable equalizer in a battery management system reduces inconsistency, affecting the

accuracy and timeliness of ISC detection. Hence, an online ISC detection method considering equalization electric quantity (EEQ) is proposed.

The existing self-discharge rate detection methods include the definition method, capacity retention method, and open-circuit voltage decay method [5].The definition method is to charge the battery to be tested to a specific SOC (State Of Charge) at a standard charging rate and stand for a period of time, discharge the battery after standing, obtain its charge and ...

Generally, the homogeneity of a battery pack is evaluated by characterizing the cells individually in terms of capacity, mass, impedance.

Moreover, we propose methods for ISC detection under four special conditions: ISC detection for the cells before grouping, ISC detection method during electric vehicle dormancy, ISC detection based on equilibrium electric quantity compensation to address negative impact of the equalization function of the battery management system on ISC ...

Here, an in situ and nondestructive technology is proposed for this purpose, by imaging the magnetic field of the battery pack during its operation, the minor current imbalance within the pack can be identified ...

A flow chart of the proposed abnormal cell detection method and the battery pack consistency evaluation is given in Fig. 1. ... capacity of 25.6 kWh and the battery pack weight is 286 kg,

Abstract. The inconsistency of cells in the battery pack is one of the main causes of battery failure. In practical applications, the terminal voltage is an important parameter that is easy to obtain and can characterize the inconsistency of cells. In this paper, a fault diagnosis method based on piecewise dimensionality reduction and outlier identification is ...

These methods employ battery pack models in conjunction with adaptive filters or nonlinear ... A fault detection method of electric vehicle battery through Hausdorff distance and modified Z-score for real-world data ... J. Sun, S. Chen, S. Xing, et al. A battery internal short circuit fault diagnosis method based on incremental capacity curves ...

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The results show that the proposed method can accurately diagnose the capacity consistency of the tested battery pack, which provides a basis for battery pack performance ...

Anomaly Detection Method for Lithium-Ion Battery Cells Based on Time Series Decomposition and Improved Manhattan Distance ... resulting in accelerated degradation in capacity and power.16,17 Moreover, premature failure of ... cells within the battery pack is an important guarantee for the safe and reliable

operation of electric vehicles.20 ...

Zhang et al. proposed a lithium-ion battery ISC detection algorithm based on loop current detection [8]. This method achieved ISC fault detection for any single battery in a multi-series and dual-parallel connected battery pack through loop current monitoring. ... A remaining charging electric quantity based pack available capacity optimization ...

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