



# Battery pack heating modification method

Therefore, this paper proposes a heating method based on model prediction to support the low-temperature operation of battery pack without additional power sources. Battery pack model is developed based on Thevenin equivalent circuit model. A co-estimator is ...

As the plateau environment is characterized by low air pressure and low density, it greatly limits the heat dissipation performance of high-power electromechanical equipment. Especially for new military combat equipment in China, such as hybrid armored vehicles, effective heat dissipation of power batteries is essential for their operational viability in intricate plateau ...

GAN Yunhua, WANG Jianqin, LIANG Jialin. Cooling performance of cylindrical battery pack based on thermal management system with heat pipe[J]. CIESC Journal, 2018, 69(5): 1964-1971., . [J].

However, the bidirectional pulse heating is still under testing on cell or small module level in labs, a major challenge for applying it to battery packs is the inconsistency between cells [7], which can cause differences in the ...

To improve the low-temperature charge-discharge performance of lithium-ion battery, low- temperature experiments of the charge-discharge characteristics of 35 Ah high-power lithium-ion batteries have been conducted, and the wide-line metal film method for heating batteries is presented. At -40 °C, heating and charge-discharge experiments have been ...

A Battery Thermal Management System, or BTMS, helps to maintain a battery pack at its optimal temperature range of 20 °C to 45 °C regardless of ambient temperature. For each vehicle design, the required performance and cycle life of the battery pack will be

Regarding the battery pack TMS, as in the previous models, the BMW i4 eDrive40 has an indirect liquid-based TMS for the battery pack characterised by control valves and units for the HVAC system, which can heat up or cool down the cells using any

Therefore, internal heating methods can heat each battery individually when heating the entire battery pack, which greatly improves the consistency of the temperature inside the pack. Additionally, compared with the external heating method, generating heat inside the battery also avoids the loss of heat during the heat transfer process and increases the rate of ...

discharging condition. Esmaeili Javad et al<sup>5</sup> studied the method of deriving heat source term for lithium-ion battery pack. They considered the heat of mixing and enthalpy heating terms as ...

The bidirectional pulse heating is tested on the electric motorcycle during winter season in Beijing, and the



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experimental results show that the temperature of the battery pack increases as expected. The proposed method will be applied on the motorcycle and improve with battery aging data in the future.

This paper proposes a novel heating strategy to heat battery from extremely cold temperatures based on a battery-powered external heating structure. The strategy contains ...

Download Citation | Model prediction-based battery-powered heating method for series-connected lithium-ion battery pack working at extremely cold temperatures | The degraded performance of lithium ...

Under appropriate voltage protection limits, AC heating methods do not exacerbate battery aging. [84] LiMnNiCoO<sub>2</sub> battery 2.21 /min (cell) 2.59 /min (pack) An adaptive echelon heating method is proposed to obtain the optimal preheating performance. [102]

As a result, they showed that the assembly of PCM and heat pipe is an effective method to control battery temperature under long-term operating conditions. The goal of this research is to specify the thermal performance of phase-change materials, liquid-assisted and hybrid BTMS, which are generally used for cooling li-ion batteries.

When heat is generated inside the battery pack, the heat is blown through the air duct to the cooler to dissipate the heat. TEC is a method that uses materials with thermoelectric energy conversion to cool electronic components.

Similar to PTC heating, by placing wide-line metal films on the two largest surfaces of prismatic battery cells, a battery pack could be heated. Experimental results show ...

Current battery pack design primarily focuses on single layout configurations, overlooking the potential impact of mixed arrangements on thermal management performance. ...

A novel battery test bench was developed to analyze lithium-ion cells made from aluminum combined with specialized ceramic heaters, forming a battery pack with different heat generation rates. The study also ...

the battery heating control method for double vehicle heating provided by the embodiments of the present application, through controlling the on-off states of the first switching device and the second switching device, and through using the energy storage device as a medium of electric energy, the battery packs of two vehicles connected therewith could be enabled to realize an ...

The rapid increase in emissions and the depletion of fossil fuels have led to a rapid rise in the electric vehicle (EV) industry. Electric vehicles predominantly rely on lithium-ion batteries (LIBs) to power their electric motors. However, the charging and discharging processes of LIB packs generate heat, resulting in a significant decline in the battery performance of EVs. ...



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Battery packs found in electric vehicles (EVs) require thermal management systems to maintain safe operating temperatures in order to improve device performance and alleviate irregular temperatures that can cause irreversible damage to the cells. Cylindrical lithium-ion batteries are widely used in the electric vehicle industry due to their high energy density ...

Most related items These are the items that most often cite the same works as this one and are cited by the same works as this one. Mohammed, Abubakar Gambo & Elfeky, Karem Elsayed & Wang, Qiuwang, 2022. "Recent advancement and enhanced battery performance using phase change materials based hybrid battery thermal management for electric vehicles," Renewable ...

When designing a thermal management system of power batteries, it is often necessary to establish a thermal model of power batteries to simulate and analyze the changes of battery temperature. The calculation of heat generation of lithium-ion batteries is related to...

Furthermore, overheating can give rise to the occurrence of thermal runaway when the heat in a battery pack is not dissipated properly. ... leading to lower internal resistance and less heat production. Such modification can fundamentally reduce the heat and ...

Therefore, internal heating methods can heat each battery individually when heating the entire battery pack, which greatly improves the consistency of the temperature ...

The feasibility of designing a reliable high-frequency battery heating circuit has been proved in recent years. Significant efforts have been devoted to the topology design for self-heaters [12].For instance, an AC battery self-heating topology was proposed by Shang in [13], where a sawtooth heating current could be generated based on a buck-boost converter.

Internal short circuit (ISCr) is one of the major obstacles to the improvement of the battery safety. The ISCr may lead to the battery thermal runaway and is hard to be detected in the early stage. In this work, a new ISCr detection method based on the symmetrical loop circuit topology (SLCT) is introduced. The SLCT ensures that every battery has the same priority in ...

Among electric vehicle (EV) fire accidents, battery failure accounts for more than 70 % [3].Lithium-ion battery generates significant heat and flammable gas during thermal runaway, which can even cause the battery to burn or explode. Especially in large battery ...

To improve the low-temperature charge-discharge performance of lithium-ion battery, low- temperature experiments of the charge-discharge characteristics of 35 Ah high-power lithium-ion batteries have been conducted, ...



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Hence, the effective battery heating method is necessary to control the temperature of battery pack within a desired range at low temperatures. According to the type of heat transfer medium, the methods commonly used in EV's battery thermal management (BTM) system can be divided into air-based [ 7 ], liquid-based [ 8 ], phase change material-based [ 9 ], ...

During the high-power charging and discharging process, the heat generated by the energy storage battery increases significantly, causing the battery temperature to rise sharply and the ...

In this paper, a comprehensive analysis of the effects of low temperatures on lithium-ion cells, the mechanisms and detection methods of lithium plating, the estimation of performance parameters of lithium-ion ...

For the embedded heating elements, Wang et al. [17] embedded nickel foil inside the battery and utilized the heat generated by the nickel foil to heat the battery. Although this method can heat the battery from -20 C to 0 C in 20 s, it requires a redesign of the

Traditional remanufacturing is characterized by disassembly of a core up to an optimal depth of disassembly and by the replacement of some parts in order to achieve the specifications and reliability of the original product. ...

A simulation model for the battery pack during the fast charging-cooling process is developed and confirmed through experiments. In addition, a fast charging-cooling joint control strategy for the ...

The model sketch of SAC heater for battery pack heating is plotted in Fig. 5, which is composed of battery pack, full bridge inverter and a PID controller. In the sketch, M1 and M2 are modeled with the electrothermal coupling model shown in the Fig. 2.

Fault identification and quantitative diagnosis method for series-connected lithium-ion battery packs based on capacity estimation IEEE Trans Ind Electron, 69 ( 3 ) ( 2021 ), pp. 3059 - 3067 Google Scholar

The battery pack heating apparatus is applicable portably and externally to a vehicle and includes: ...  
238000012986 modification Methods 0.000 description 2 230000004048 modification Effects 0.000  
description 2 206010068065 Burning mouth syndrome 0.000 ...

Lithium-ion batteries (LIBs) have the advantages of high energy/power densities, low self-discharge rate, and long cycle life, and thus are widely used in electric vehicles (EVs). However, at low temperatures, the peak power and available energy of LIBs drop sharply, with a high risk of lithium plating during charging. This poor performance significantly impacts ...

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