



# Power of liquid-cooled lithium battery

Sun, X., et al.: Research on Thermal Equilibrium Performance of Liquid-Cooled Lithium-Ion ... THERMAL SCIENCE: Year 2020, Vol. 24, No. 6B, pp. 4147-4158 4147 RESEARCH ON THERMAL EQUILIBRIUM PERFORMANCE OF LIQUID-COOLED LITHIUM-ION POWER BATTERY SYSTEM AT LOW TEMPERATURE by Xudong SUN, Xiaoming ...

This thesis explores the design of a water cooled lithium ion battery module for use in high power automotive applications such as an FSAE Electric racecar. The motivation for liquid cooling in this application is presented with an adiabatic battery heating simulation followed by a discussion of axial cooling based on the internal construction ...

liquid cooled lithium-ion batteries, power conversion systems (PCS), transformers, communications and auxiliary equipment. The batteries will be installed in custom- built, above-ground enclosures that are integrated as turnkey energy storage systems. Each enclosure will have its own

Currently, the mainstream liquid cooling strategy for cylindrical cells is to design pipes/plates with curved surface. Owing to the curve surface of cylindrical cells and the large scale of an actual power battery module, the structure of the liquid cooling pipes/plates is relatively complicated and its performance is inevitably affected by ...

Lithium-ion (Li-ion) batteries are widely known for their energy efficiency and are becoming the battery of choice for designers of electric vehicles (EVs). ... and power requirements of EVs, liquid ...

The power battery is an important component of new energy vehicles, and thermal safety is the key issue in its development. During charging and discharging, how to enhance the rapid and uniform ...

The battery module was composed of 90 cylindrical cells with a rated specification of 54 V/13.2 Ah. The technical specification of each cell is shown in Table S1, corresponding to the commercial cell used in the experimental tests. As shown in the schematic diagram (Fig. 1 a), the LCPs were sandwiched between two rows of the ...

Thermal management of cylindrical lithium-ion battery based on a liquid cooling method with half-helical duct. Appl. Therm. Eng., 162 (2019), Article 114257. ... Thermal performance of mini-channel liquid cooled cylinder based battery thermal management for cylindrical lithium-ion power battery. Energy Convers. Manage., 103 ...

This article reviews the latest research in liquid cooling battery thermal management systems from the perspective of indirect and direct liquid cooling. Firstly, different coolants are compared. The ...

The influence of the channels of a liquid-cooled plate on the heat dissipation performance of battery module is



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investigated in this paper. A topology optimization method for obtaining channel configurations of the liquid cooled plate is presented. Firstly, the battery pack cooling system test platform is built to test the flow ...

The Lithium-ion rechargeable battery product was first commercialized in 1991 [15]. Since 2000, it gradually became popular electricity storage or power equipment due to its high specific energy, high specific power, lightweight, high voltage output, low self-discharge rate, low maintenance cost, long service life as well as low mass-volume ...

The structural design of liquid cooling plates represents a significant area of research within battery thermal management systems. In this study, we aimed to analyze the cooling performance of topological structures based on theoretical calculation and simple structures based on design experience to achieve the best comprehensive ...

A systematic review and comparison of liquid-based cooling system for lithium-ion batteries. Author links open overlay panel Jun Xu a b 1, Zhechen Guo a b 1, Ziming Xu a b, Xuan Zhou c, Xuesong Mei a b. ... A comprehensive review on thermal management systems for power lithium-ion batteries. Renew Sustain Energy Rev, 139 ...

Structure optimization of liquid-cooled plate for electric vehicle lithium-ion power batteries. Author links open overlay panel Ding Zhao, Chao An, Zhixue Jia, Zhiguo Lei 1. ... [26] designed an indirect liquid-cooled BTMS for a battery module. The system places an LCP between every two batteries. Compared with the liquid-cooled coupled ...

Liquid cooling system is of great significance for guaranteeing the performance of lithium-ion battery because of its good conductivity to keep battery working in a cool environment.

To maintain the maximum temperature within the optimum range and to improve the temperature uniformity of cylindrical lithium-ion battery, a liquid cooling method based on the half-helical duct was proposed. ... Thermal management for high power lithium-ion battery by minichannel aluminum tubes. Appl. Therm. Eng., 101 ...

Jian Xu's paper titled "Thermal Management of High-Power Lithium-ion Battery Using Mini-channel Aluminum Tubes" discusses how cell size plays a crucial role in the thermal behavior of batteries due to variations in the heat transfer area per unit volume. ... The battery can be cooled by having the liquid directly encounter the battery cell ...

Download Citation | On Jan 1, 2024, Ding Zhao and others published Structure optimization of liquid-cooled plate for electric vehicle lithium-ion power batteries | Find, read and cite all the ...

Currently, lithium-ion batteries are attracting the attention of various sectors, such as the automobile, electronics, and aerospace industries, due to their remarkable characteristics, including high energy density,



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power density, and superior operational performance, when compared to other batteries.

DOI: 10.1016/J.APPLTHERMALENG.2019.113760 Corpus ID: 164823199; Optimization design and numerical study on water cooling structure for power lithium battery pack @article{Tang2019OptimizationDA, title={Optimization design and numerical study on water cooling structure for power lithium battery pack}, author={Aikun Tang ...

Engineering Excellence: Creating a Liquid-Cooled Battery Pack for Optimal EVs Performance. As lithium battery technology advances in the EVS industry, emerging challenges are rising that demand more sophisticated cooling solutions for lithium-ion batteries. Liquid-cooled battery packs have been identified as one of the ...

Capacity, High-Power Lithium-Ion Battery Packs Ho Teng and Kim Yeow AVL Powertrain Engineering, Inc. ABSTRACT Battery packs for plug-in hybrid electrical vehicle (PHEV) applications can be characterized as high-capacity and high- ... Thus, a liquid cooling system for the battery pack is generally integrated with the AC system of ...

Design of Direct and Indirect Liquid Cooling Systems for High- Capacity, High-Power Lithium-Ion Battery Packs 2012-01-2017. Battery packs for plug-in hybrid electrical vehicle (PHEV) applications can be characterized as high-capacity and high-power packs. ... Thermal Analysis of a Li-ion Battery System with Indirect Liquid ...

Adequate thermal management is critical to maintain and manage lithium-ion (Li-ion) battery health and performance within Electrical Vehicles (EVs) and Hybrid Electric Vehicles (HEVs). Numerical models can assist in the design and optimization of thermal management systems for battery packs. Compared with distributed models, reduced-order models ...

At the present time, there are several cooling methods of the BTMS: air cooling, liquid cooling, phase change material cooling, heat pipe cooling, etc. Air cooling was widely applied in early battery thermal management design for its low cost, simple structure and convenient maintenance, which mainly referred to natural air ...

Section snippets Physical models. This article focuses on cooling system for batteries, which have been simplified from the actual item. The basic simplified model of the lithium-ion battery pack, which is equipped with a series of novel cooling systems and includes a single lithium-ion battery and different types of cooling structures, is shown ...

Lithium-ion batteries (LIBs) are considered one of the most promising battery chemistries for automotive power applications due to their high power density, high nominal voltage, low self-discharge rate, and long cycle life [4], [5]. However, compared to internal combustion engine vehicles, electric vehicles (EVs) require a significant number ...



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This paper summarized the development status of the latest power lithium-ion battery liquid cooling system, different types of liquid cooling system were compared, the performance comparison and application analysis of different coolants were also carried out, and the advantages and disadvantages of various cooling system structures were ...

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Lithium-ion (Li-ion) batteries are widely known for their energy efficiency and are becoming the battery of choice for designers of electric vehicles (EVs). ... and power requirements of EVs, liquid cooling is a viable option for Li-ion batteries in EVs. Direct liquid cooling requires the battery cells to be submerged in the fluid, so it's ...

Abstract. This study proposes a stepped-channel liquid-cooled battery thermal management system based on lightweight. The impact of channel width, cell-to-cell lateral spacing, contact height, and contact angle on the effectiveness of the thermal control system (TCS) is investigated using numerical simulation. The weight sensitivity factor is ...

DOI: 10.2298/tsci200118155s Corpus ID: 216252290; Research on thermal equilibrium performance of liquid-cooled lithium-ion power battery system at low temperature @article{Sun2020ResearchOT, title={Research on thermal equilibrium performance of liquid-cooled lithium-ion power battery system at low temperature}, author={Xudong ...

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Under large discharge rate conditions, air-cooled can no longer meet the heat dissipation requirements of the LiBs due to the low heat dissipation capacity [16].Whereas liquids have a higher thermal conductivity and specific heat, with better heat dissipation performance [17].Therefore, Liquid-cooled is a common heat dissipation ...

In this article, the influence of aerogel insulation on liquid-cooled BTMS is analyzed employing experiments and simulations. In the experiment results, it is revealed that aerogel reduces heat dissipation from liquid-cooled battery packs, leading to elevated peak temperatures and steeper temperature gradients.

Liu et al. [26] designed an indirect liquid-cooled BTMS for a battery module. The system places an LCP between every two batteries. Compared with the liquid-cooled coupled with phase change material-cooled BTMS, it was found that the cooling efficiency of the liquid-cooled system was higher.

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