Liquid-cooled energy storage battery connected to capacitor

Can a liquid cooling structure effectively manage the heat generated by a battery?
Discussion: The proposed liquid cooling structure design can effectively manageand disperse the heat generated by the battery. This method provides a new idea for the optimization of the energy efficiency of the hybrid power system. This paper provides a new way for the efficient thermal management of the automotive power battery.

Does liquid cooled heat dissipation work for vehicle energy storage batteries?
To verify the effectiveness of the cooling function of the liquid cooled heat dissipation structure designed for vehicle energy storage batteries, it was applied to battery modules to analyze their heat dissipation efficiency.

Are lithium-ion capacitors suitable for high current applications?
For this aim,the lithium-ion capacitors (LiC) have been developed and commercialized,which is a combination of Li-ion and electric double-layer capacitors (EDLC). The advantages of high-power compared to Li-ion properties and high-energy compared to EDLC properties make the LiC technology a perfect candidate for high current applications.

How does a lithium ion battery cooling cell work?
Two thermocouplesare placed on the surface of the cell,where one is mounted on the top center of the cell between the tabs of the battery,and the other thermocouple is mounted on the edge of the cell. The contact surface between the LiC cell and the cooling plate is coated by thermal grease as the TIM.

What is battery liquid cooling heat dissipation structure?
The battery liquidcooling heat dissipation structure uses liquid,which carries away the heat generated by the battery through circulating flow,thereby achieving heat dissipation effect (Yi et al.,2022).

Does liquid cooling structure affect battery module temperature?
Bulut et al. conducted predictive research on the effect of battery liquid cooling structure on battery module temperature using an artificial neural network model. The research results indicated that the power consumption reduced by 22.4% through optimization. The relative error of the prediction results was less than 1% (Bulut et al., 2022).

The research presented in this paper proposes a hybrid energy storage system that combines both electrolytic double-layer capacitors (EDLCs) also known as supercapacitors (SCs) and lithium-ion capacitors (LiCs) also known as hybrid capacitors (HCs) with a battery through a multiple input converter.

High-power lithium-ion capacitors (LiC) are hybrid energy storage systems (EES) with the combined benefits of lithium-ion batteries (LiB) and supercapacitors, such as ...

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Lithium-ion capacitor technology (LiC) is well known for its higher power density compared to electric double-layer capacitors (EDLCs) and higher energy density compared to lithium-ion batteries (LiBs). However, the LiC technology is affected by a high heat generation problem in high-power applications when it is continuously being charged ...

High-power lithium-ion capacitors (LiC) are hybrid energy storage systems (EES) with the combined benefits of lithium-ion batteries (LiB) and supercapacitors, such as high specific energy, high...

In this study, a liquid-based TMS is designed for a prismatic high-power lithium-ion capacitor (LiC). The proposed TMS integrates a LiC cell surrounded by two cooling plates through which...

In this study, a liquid-based TMS is designed for a prismatic high-power lithium-ion capacitor (LiC). The proposed TMS integrates a LiC cell surrounded by two cooling plates through which coolant fluid flows into serpentine channels. This study aims to explore factors that affect the temperature contour and uniformity of the battery.

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The global warming crisis caused by over-emission of carbon has provoked the revolution from conventional fossil fuels to renewable energies, i.e., solar, wind, tides, etc [1].However, the intermittent nature of these energy sources also poses a challenge to maintain the reliable operation of electricity grid [2] this context, battery energy storage system ...

The research presented in this paper proposes a hybrid energy storage system that combines both electrolytic

double-layer capacitors (EDLCs) also known as supercapacitors (SCs) and lithium-ion capacitors (LiCs) also ...

Lithium-ion batteries are increasingly employed for energy storage systems, yet their applications still face thermal instability and safety issues. This study aims to develop an ...

The proposed optimization method of liquid cooling structure of vehicle energy storage battery based on NSGA-II algorithm takes into account the universality and ...

Keywords: NSGA-II, vehicle mounted energy storage battery, liquid cooled heat dissipation structure, lithium ion batteries, optimal design. Citation: Sun G and Peng J (2024) Optimization of liquid cooled heat dissipation structure for vehicle energy storage batteries based on NSGA-II. Front. Mech. Eng 10:1411456. doi: 10.3389/fmech.2024.1411456

The proposed optimization method of liquid cooling structure of vehicle energy storage battery based on NSGA-II algorithm takes into account the universality and adaptability of the algorithm during design. Therefore, this method is not only suitable for the battery module size and configuration used in the current study, but also has the ...

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