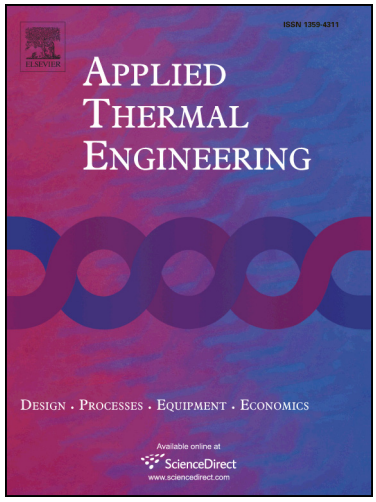

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Investigation on the promotion of temperature uniformity for the designed Battery Pack with Liquid Flow in cooling process

Tianshi Zhang [1, 2], Qing Gao [1, 2,*] Guohua Wang [1, 2], Yanlong Gu [2],Yan Wang[2]， Wendi Bao[2], Dezhi Zhang [3]

1. State Key Laboratory of Automotive Simulation and Control, Jilin University, 130025, Changchun, China;

2. College of Automotive Engineering, Jilin University, 130025, Changchun, China;

3. FAW R&D Centre, China First Automobile Works Group Corp, 130011, Changchun, China

Email: zhangtianshi@jlu.edu.cn

Abstract: To keep the temperature of the battery pack at an optimal range for electric vehicles (EV), a liquid heat exchange structure is designed using aluminum flat tube bank. The flexible graphite is used to enhance the heat transfer of the battery thermal management, and its effect and a proper cooling method are explored. The investigation focuses on the thermal characteristics in the process of the BTM, such as the equilibrium temperature, temperature variation rate, and temperature difference, etc. The results show that the battery pack has a good cooling and lightweight effect, and the maximum temperature difference of the battery cells could be kept below 5℃. The temperature uniformity of the battery pack is improved obviously by using the flexible graphite. Meanwhile, the cascade cooling method can reduce the drastic temperature fluctuation and improve the temperature uniformity of the battery pack under non-equilibrium states. In addition, the BTM is not sensitive to the variation of the liquid flow in the experimental conditions, and this will benefit to reduce power consumption of the pump.

Keywords: Battery thermal management; Flat tube bank; Flexible graphite; Cascade cooling; Temperature uniformity

11 Introduction

As the key component of electric vehicles (EV), the power battery pack presents the development tendency of high-capacity and large-scale, especially for pure electric vehicles (PEV), and it can generate lot of heat during the high current discharge process. In fact, the lithium ion (Li-ion) battery is very sensitive to the temperature. The high ambient temperature and the driving loads will further intensify the overheating of the battery pack, and affect the performance and the

Corresponding Email: gaoqing@jlu.edu.cn.