Direct cooling for fast charging of electric vehicles

Abstract:
Fast charging electric vehicles will pose new challenges for battery thermal management systems. The waste heat produced by the battery cell exceeds the maximum cooling capacities of state of the art cooling systems. This paper introduces an alternative approach for battery cooling and heating. Decoupling the battery thermal management from the HVAC (Heating, Ventilation and Air Conditioning) will have positive effects on the HVAC complexity and on the performance of the thermal management. Certainly the fast charging of electric scooters and motorcycles can also benefit from this approach. A qualitative analysis of the advantages and disadvantages is presented in the following paper. In addition a detailed comparison of 7 refrigerants is conducted especially for vehicles which currently feature no HVAC. As a result Propane was found to be an efficient, environmental-friendly and inexpensive refrigerant for the battery thermal management. At last the issue of dissipating large heat flows in a standing vehicle without larger condensers or high fan noise levels is solved by increasing the condenser temperature. This inhibits lower energy efficiency but will have no effect on the driving range as the energy is provided by the charging station.

Stichworte:
CoFAT, FTM, battery thermal management, fast charging, refrigerant, two-wheeler

Jahr:
2018

TUM Einrichtung:
Lehrstuhl für Fahrzeugtechnik

Occurences:
- Hochschulbibliographie > 2018 > Fakultäten > Maschinenwesen > Lehrstuhl für Fahrzeugtechnik (Prof. Lienkamp)
- Einrichtungen > Fakultäten > Fakultät für Maschinenwesen > Institut für Maschinen- und Fahrzeugtechnik > Lehrstuhl für Fahrzeugtechnik (Prof. Lienkamp) > Tagungen > Conference on Future Automotive Technology (CoFAT) > 2018

entries: