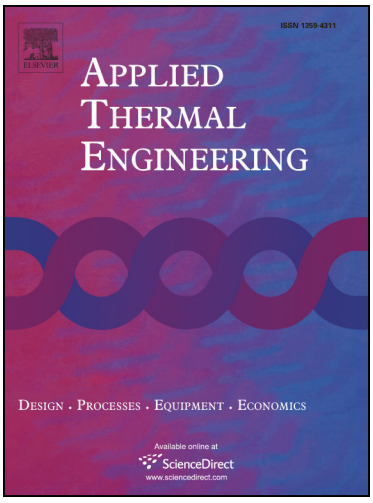

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Heat transfer performance of flexible oscillating heat pipes for electric/ hybrid-electric vehicle battery thermal management

Jian Qu[a,*], Cheng Wang[b], Xiaojun Li[a], Hai Wang[a]

[a]*School of Energy and Power Engineering, Jiangsu University, Zhenjiang, Jiangsu, 212013 China*

[b]*School of Petroleum Engineering, Changzhou University, Changzhou, Jiangsu, 213016 China*

ABSTRACT

In this paper, three flexible oscillating heat pipes (FOHPs) were experimentally tested to evaluate the effects of adiabatic length and structural style on the start-up, evaporator temperature and overall thermal resistance. The adiabatic sections of FOHPs were made of fluororubber tubes with an inner diameter of 4 mm. Deionized water was used as the working fluid at a volumetric filling ratio of 50%. The evaporator temperature could be maintained below 50℃ when the power inputs were about 121, 51 and 25 W for "I" shape FOHPs at adiabatic lengths of 570, 700 and 870 mm, respectively. The bending of adiabatic section had a negative impact on the thermo-hydrodynamic behaviour of FOHPs due to the increase in two-phase flow resistance and reduction in "pump power" provided by the gravity and therefore degrading the heat pipe performance. Although the reduction of adiabatic length reduced the evaporator temperature and elevated the FOHP performance featured by "I" and "stair-step" shapes, the best performance appeared at the adiabatic length of 700 mm for "inverted-U" and "N" shape FOHPs. FOHPs with small bending exhibited acceptable heat transfer performance, providing a possible solution for electric/hybrid-electric vehicle battery thermal management.

***Keywords*:** Flexible oscillating heat pipe; Thermal management; Electric vehicle; Heat transfer performance; Start-up

* Corresponding author

Tel.: +86-159-5280-4218 E-mail address: rjqu@ujs.edu.cn