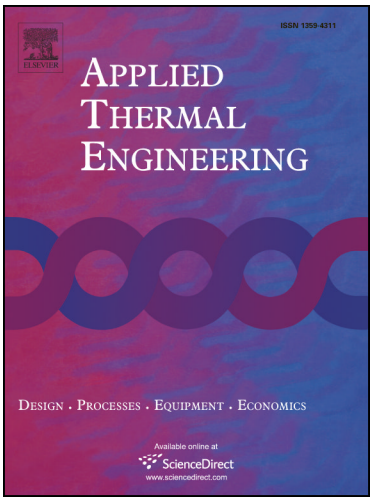

Research Paper

Heat performances of a thermosyphon as affected by evaporator wettability and filling ratio

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PII: S1359-4311(17)33036-3
DOI: https://doi.org/10.1016/j.applthermaleng.2017.10.073
Reference: ATE 11271

To appear in: *Applied Thermal Engineering*

Received Date: 4 May 2017
Revised Date: 11 September 2017
Accepted Date: 10 October 2017

Please cite this article as: Z. Xu, Y. Zhang, B. Li, C-C. Wang, Q. Ma, Heat performances of a thermosyphon as affected by evaporator wettability and filling ratio, *Applied Thermal Engineering* (2017), doi: https://doi.org/10.1016/j.applthermaleng.2017.10.073

Heat performances of a thermosyphon as affected by evaporator wettability and filling ratio

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ABSTRACT

A thermosyphon is considered an efficient heat dissipation device in engineering fields due to its low thermal resistance. The heat transfer mechanisms for thermosyphons at different evaporator wettability and filling ratios are not well detailed. A model considering evaporator wettability in terms of a contact angle is developed to detail the phase change process to explore the heat transfer mechanism for a thermosyphon in this study. The effects of evaporator wettability and filling ratio on the heat performances of a thermosyphon charged with water are investigated. It is observed that the simulated absolute temperatures with a contact angle are in better agreement with the experimental results with an average relative error of 0.15% than the simulation results without a contact angle (0.28%). The results show that a hydrophilic surface causes bubbles to easily depart the evaporator wall, thereby increasing the heat performance, whereas a hydrophobic surface causes bubbles to adhere to the evaporator wall, decreasing the heat performance. Further study shows that a low filling ratio of 12% will result in drying out, but a high filling ratio of 40%

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