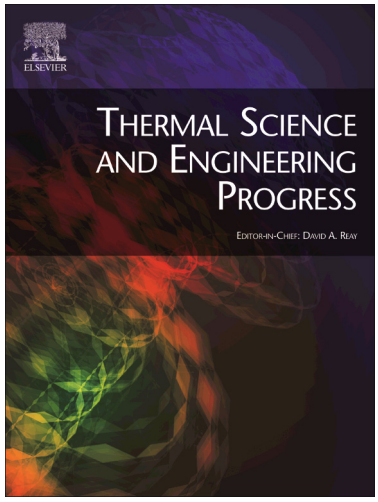

Multi objective geometric optimization of phase change material based cylindrical heat sinks with internal stem and radial fins

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PII: S2451-9049(17)30251-2
DOI: https://doi.org/10.1016/j.tsep.2017.10.003
Reference: TSEP 67

To appear in: *Thermal Science and Engineering Progress*

Please cite this article as: S. Sridharan, R. Srikanth, C. Balaji, Multi objective geometric optimization of phase change material based cylindrical heat sinks with internal stem and radial fins, *Thermal Science and Engineering Progress* (2017), doi: https://doi.org/10.1016/j.tsep.2017.10.003

Multi objective geometric optimization of phase change material based cylindrical heat sinks with internal stem and radial fins

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Abstract

This work presents the results of the multi objective geometric optimization of a phase change material based (PCM) cylindrical heat sink with thermal conductivity enhancers (TCEs) in the form of an internal stem with radial fins. The effect of change in the geometric distribution of the TCEs on the performance of the heat sink was studied while maintaining the total volume of TCEs constant. The ratio of the volume of the TCEs to the cavity was also fixed constant at 10%. Initially, experiments were carried out on a cylindrical heat sink with a PCM fill ratio of 99%. A constant heat input of 6W was applied at the bottom of the heat sink through an electrical heater. The PCM used is n-eicosane and the heat sink is made of aluminium. Numerically obtained results from ANSYS Fluent 15.0 were compared with in-house experimental results to determine the heat transfer coefficient from the walls of the heat sink. The heat sink and TCE parameters namely the diameter of the cavity, the height of the cavity, the diameter of the stem, the number of fins and the thickness of fins were treated as design variables. For

☆ *Preprint submitted to Thermal Science and Engineering Progress* *October 3, 2017*

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