

## Accepted Manuscript

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PII: S1359-4311(17)35850-7  
DOI: <https://doi.org/10.1016/j.applthermaleng.2017.12.006>  
Reference: ATE 11527

To appear in: *Applied Thermal Engineering*

Received Date: 9 September 2017  
Revised Date: 13 November 2017  
Accepted Date: 2 December 2017

Please cite this article as: H. Tang, Y. Tang, J. Li, Y. Sun, G. Liang, R. Peng, Experimental investigation of the thermal performance of heat pipe with multi-heat source and double-end cooling, *Applied Thermal Engineering* (2017), doi: <https://doi.org/10.1016/j.applthermaleng.2017.12.006>

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# Experimental investigation of the thermal performance of heat pipe with multi-heat source and double-end cooling

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## **Abstract**

This study proposes a cooling approach referred to as multi-heat source and double-end cooling (MSDC), which is suitable for overcoming the problems encountered in the cooling of multi-heat source spacecraft applications. In this approach, multiple heat sources were placed at the middle section of an ordinary heat pipe, and two heat sinks were installed at both ends of the pipe. An experimental apparatus was set up to investigate the thermal performance of the heat pipe with MSDC. The effects of various heat inputs, power distributions, and cooling-water flow rates on the thermal performance of the heat pipe were analysed, and the experimental results were compared with those obtained by a traditional cooling method. The results demonstrate that the incorporation of MSDC in a heat pipe considerably enhances the thermal performance of the heat pipe. Additionally, the heat pipe can become operational in a short while, and the temperature in each section attains a steady value under high and variable input-power. The results indicate that the proposed approach is highly suitable for cooling multiple heat source systems in space or in a horizontal orientation because of its stable operation at high heat flux as well as its space efficiency.

**Keywords:** Heat pipe; Thermal management; Multi-heat source; Double-end cooling

## **1. Introduction**

The reduction of size and mass always play a crucially important role in both reducing the launch cost

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