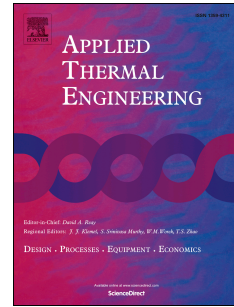


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Experimental and numerical study on the heat sink with radial fins and a concentric ring subject to natural convection

Bin Li, Chan Byon



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TECHNICAL NOTE**Experimental and numerical study on the heat sink with radial fins and a concentric ring subject to natural convection****Bin Li¹ and Chan Byon^{1*}**

1 School of Mechanical Engineering,
Yeungnam University,
Gyeongsan, Korea, 712-749

* Corresponding author: E-mail: cbyon@ynu.ac.kr, TEL: +82-53-810-2452, FAX: +82-53-810-4627

Abstract

This article reports an experimental and numerical study on the orientation effect for a radial heat sink with a circular base, concentric ring, and rectangular fins. Parametric studies are performed to investigate the effects of orientation angle with respect to gravity, various geometric parameters (fin number, fin length, fin height, and height of the base), Elenbaas number, on Nusselt number. The results show that the influences of fin number and fins length on the orientation effect are significant, whereas the fin height and base height are slightly insignificant. From the numerical and experimental results, it is shown that the horizontally oriented radial heat sinks have better thermal performance than vertically oriented radial heat sink due to the existence of the concentric ring preventing the natural convective upward flow. The present numerical model is shown to predict the experimental results well within error of 4%. Finally, a closed-form correlation for predicting Nusselt number with heat sink design parameters is proposed.

Keywords: heat sink, radial fins, concentric ring, natural convection

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