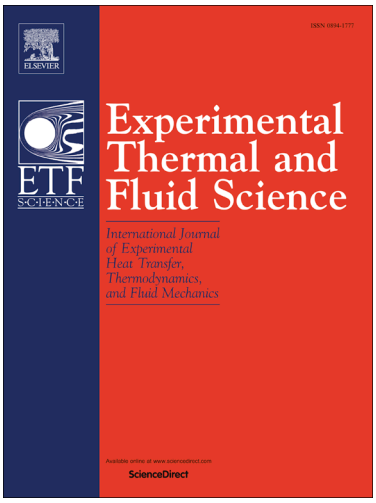

Thermal Energy Absorption in a Heat Sink with Elliptical Cross Section and Tangential Impinging Inlet Flow of Nanofluid

Seyed Ziaedin Miry, Sina Lohrasbi, Hesam Irani, Mehdi Ashjaee, Davood Domiri Ganji

PII: S0894-1777(17)30221-2
DOI: http://dx.doi.org/10.1016/j.expthermflusci.2017.07.025
Reference: ETF 9167

To appear in: *Experimental Thermal and Fluid Science*

Received Date: 17 April 2017
Revised Date: 21 July 2017
Accepted Date: 30 July 2017

Please cite this article as: S. Ziaedin Miry, S. Lohrasbi, H. Irani, M. Ashjaee, D. Domiri Ganji, Thermal Energy Absorption in a Heat Sink with Elliptical Cross Section and Tangential Impinging Inlet Flow of Nanofluid, *Experimental Thermal and Fluid Science* (2017), doi: http://dx.doi.org/10.1016/j.expthermflusci.2017.07.025

Thermal Energy Absorption in a Heat Sink with Elliptical Cross Section and Tangential Impinging Inlet Flow of Nanofluid

Seyed Ziaedin Miry[a], Sina Lohrasbi[b1], Hesam Irani[c], Mehdi Ashjaee[a], Davood Domiri Ganji[b]

[a]*Department of Mechanical Engineering, University of Tehran, Tehran, Iran*

[b]*Department of Mechanical Engineering, Babol University of Technology, Babol, Iran*

[c] *Department of Mechanical Engineering, Islamic Azad University, Tehran, Iran*

Abstract

Heat sink has been widely used as a cooling device for electronic systems in recent years. Because of the considerable heat generated by electronic devices and low efficiency of conventional heat sinks, a large number of researches have been focused on the performance enhancement of these systems. Innovative heat sink in the presence of Al_2O_3-water nanofluid is experimentally investigated in this study. The effects of adding various volume fractions of nanoparticles on the convective heat transfer coefficient, pressure drop, thermal resistance and heat sink base temperature are investigated in different flow rates from 6.14 to 32.2 (cm^3/s). The obtained results reveal that the convective heat transfer enhances 16% and thermal resistance reduces more than 15%. The innovative thermal energy absorption system in present research is a tangential heat sink with impinging liquid jet and elliptical cross section which is expected to be able to achieve significant enhancement in thermal energy removal as a cooling device, which is proposed as the novelty here. Also comparison between cylindrical and elliptical cross sections in this type of heat sink is carried out. The results disclose that using tangential heat sink with liquid jet impingement achieves convective heat transfer coefficient 2.26 times greater than conventional heat sink in the presence of pure water.

Keywords: Convection heat transfer; Elliptical; Liquid jet impingement; Nanofluid; Tangential heat sink

[1] Corresponding author.
E-mail address: Sina.Lohrasbi@stu.nit.ac.ir
Tel: (+98) 9117853376
Fax: (+98) 1154222601