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Thermal performance of Anodised Two phase closed Thermosyphon (TPCT) using Aluminium Oxide (Al2O3) as nanofluid

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Abstract: Heat pipes are passive heat transfer devices, it transfers heat by evaporation and condensation of working fluid partially filled in it. Two phased closed thermsyphons are passive heat transfer devices, it transfers heat by evaporation and condensation of working fluid partially filled in it. Thermal performance of an anodized two-phase closed thermosyphon (TPCT) charged with Al_2O_3 nanofluid is studied and compared with that of De Ionised (DI) water as base fluid. An anodization is performed to produce a porous coating on the inner wall of thermosyphon. The anodized TPCTs filled with Al_2O_3nanofuid and DI water is evaluated for the heat supply range of 50–200 W. The effects of inclination angle, heat input and anodized surface on the thermal performance of the thermosyphon (TPCTs) are investigated. Due to the anodization process, heat transfer coefficient improves up to 45% at the inclination angle of 45° for the heat supply of 50-250W. Also, thermal resistance of the anodized TPCT is reduced by 14%, 26% and 23% respectively for horizontal, inclined and vertical positions when compared to the water as base fluid in TPCT. Thermal performance of TPCT increases Al_2O_3 nanofluid compared with based fluid (DI water).

Keywords: Anodization, Thermosyphon, Porous inner coating, Al_2O_3nanofluid, De Ionised Water, Electronic Cooling.

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