

عنوان مقاله:

Improving the natural convective heat transfer of a rectangular heatsink using superhydrophobic walls: A numerical approach

محل انتشار:

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خلاصه مقاله:

The effect of utilizing superhydrophobic walls on improving the convective heat transfer in a rectangular heatsink has been studied numerically in this paper. The vertical walls were kept at isothermal hot-and-cold temperatures and horizontal walls were insulated. The boundary condition on the walls was: no-slip for regular, and slip (with slip length of 500 μm) for superhydrophobic walls. By changing the heatsink aspect ratio (AR, height/width) from 0.1 to 10, it was observed that regardless of the wall slip, the optimum AR is 1, i.e. square enclosure. For a square heatsink, using the nanofluid with $\phi = 3\%$ could enhance the heat transfer (quantified by Nusselt number) by up to 9.8%. For the same enclosure filled with pure water, applying superhydrophobic horizontal walls could increase the heat transfer by 4.45%. The joint effect of using superhydrophobic walls and nano-particles enhanced the heat transfer by up to 14.75%. The results of this paper may open a new avenue for high performance cooling systems

کلمات کلیدی:

Natural convection, Heatsink, Local Cooling, nanofluid, Superhydrophobic, Slip Length

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