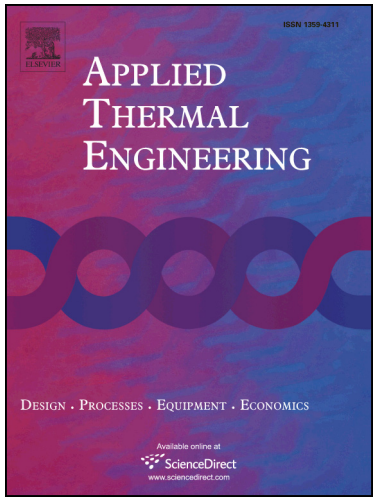

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Numerical investigation of heat transfer in microchannel using inclined longitudinal vortex generator

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Abstract: A three dimensional numerical investigation of the fluid flow and heat transfer behaviour of longitudinal vortex generator (LVG) has been carried out in a rectangular micro heat sink in the Reynolds number range between 200 and 1100 in the temperature range without involving phase change. Different combinations of two LVG pairs with different inclinations and positioning in terms of the distances from the inlet are considered for LVG heights being equal to the channel height. The best overall performance has been predicted with 30^0 LVG angle foe Reynolds number beyond 600, whereas for lower numbers higher LVG angle has been found as more suitable. Thickness of the microchannel has been found to reduce both the heat transfer and the thermal performance. Larger channel length downstream of the second LVG pair has been found to enhance the heat transfer, due to the better mixing following the vortex break up by this LVG pair. These findings have important bearing on achieving enhanced cooling performance for small electronic devices not involving any complicated geometric arrangement.

Keywords: Rectangular microchannel, heat transfer, vortex generator, friction factor, numerical simulation.