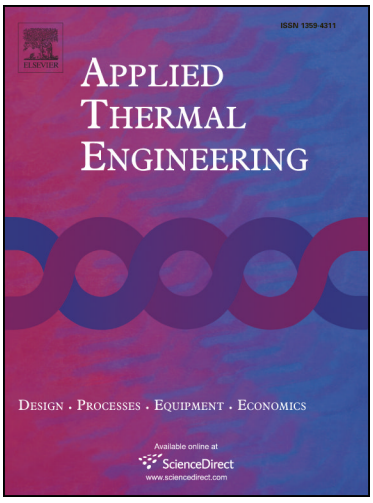

Multi-attribute optimization of a novel micro liquid block working with green graphene nanofluid regarding preferences of decision maker

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Multi-attribute optimization of a novel micro liquid block working with green graphene nanofluid regarding preferences of decision maker

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Abstract

This research attempts to examine hydrothermal attributes of the green graphene nanofluid in two novel micro liquid blocks. The graphene nanoplatelets functionalized by a biological method are employed. The results reveal that by increasing either flow velocity or graphene concentration, the cooling is augmented and the temperature of heating surface reduces. Moreover, the uniformity of temperature distribution improves with increase of the concentration and velocity. It is found that the possibility of hot spot formation on the electronic processor is lower in the case of using nanofluid rather than the base fluid. In addition, the required pumping power intensifies by increasing the concatenation and velocity. Figure of merit is greater at higher concentrations, which shows the superior merit of using the nanofluid. Two different liquid blocks are compared and the better one is optimized to reach minimum surface temperature along with minimum pumping power. The optimization is carried out for different priority grades of objective functions based on preferences of decision maker, and the optimal conditions are reported and discussed. Employing the nanofluid with maximum concentration is